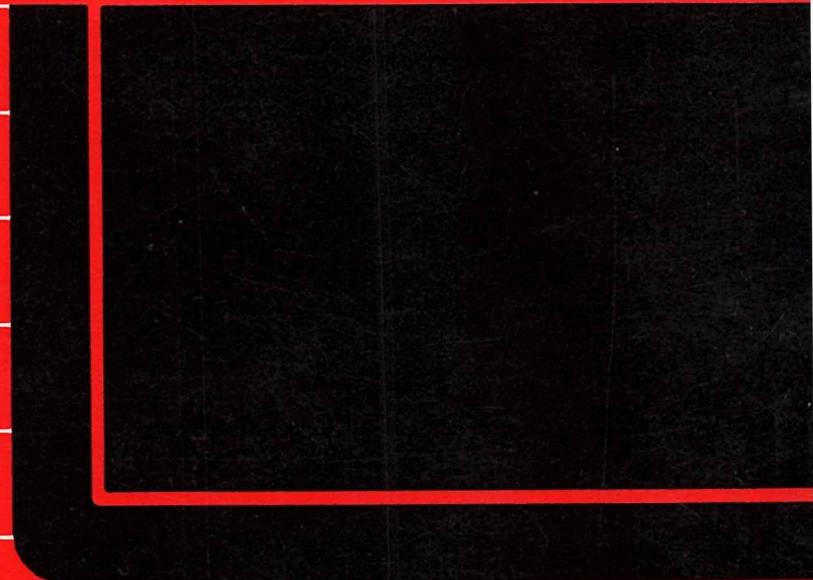


GUIDE TO OPERATIONS

MPC 160T Series

PERSONAL COMPUTER



mitac®

MPC 160T Series Guide to Operations

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FEDERAL COMMUNICATIONS COMMISSION
RADIO FREQUENCY INTERFERENCE STATEMENT

***** WARNING *****

The equipment described herein has been certified to comply with the limits for a Class B computing device, pursuant to Subpart J of Part 15 of FCC rules. Only peripherals (computer input/output devices, terminals, printers, etc.) certified to comply with the Class B limits may be attached to the computer. Operation with non-certified peripherals is likely to result in interference to radio and TV reception.

INSTRUCTIONS TO USER

This equipment generates and uses radio frequency energy and if not installed and used properly, i.e., in strict accordance with the operating instructions, reference manuals, and the service manual, may cause interference to radio or television reception. It has been tested and found to comply with the limits for a Class B computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a residential installation.

If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- * *Reorient the receiving antenna.*
- * *Relocate the equipment with respect to the receiver.*

- * Move the equipment away from the receiver.
- * Plug the equipment into a different outlet so that equipment and receiver are on different branch circuits.
- * Ensure that attachment connector screws and ground wires are tightly secured.
- * If peripherals not offered by Mitac are used with this equipment, it is suggested that you use shielded, grounded cables with in-line filters, or ferrite choke if necessary.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions.

The manufacturer is not responsible for any radio or TV interference caused by unauthorized modifications to this equipment. It is the responsibility of the user to correct such interference.

Please note: In order for an installation of this product to maintain compliance with the limits for a Class B device, shielded cables must be used for the connection of any devices external to this product.

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CHAPTER 1

GETTING TO KNOW THE SYSTEM

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GETTING TO KNOW THE SYSTEM

1.1 INTRODUCTION

This chapter outlines the components of the system and builds up some computer concepts you may need to know. It also introduces some options and peripherals that you may operate with the system so that you will become more familiar with this system.

1.2 SYSTEM OVERVIEW

The **system** is a powerful tool designed to handle all your business and personal needs. It also offers several standard features and many options so that you can tailor the system to fit your exact needs. And by adding options later, the system can grow with your expanding needs.

The **system** is controlled by the base unit (Figure 1.1). Inside this box is the computer itself, an expansion unit with 5 slots to hold options, and the mass storage devices (i.e. floppy disk drives or Winchester disk drives). The base unit also contains the power supply. The system unit can run at 4.77 MHz or 8 MHz by typing **t5** or **t8** respectively. You will learn more about entering commands later.

You direct the operations of the computer by entering commands from the keyboard. The keyboard is much like a typewriter keyboard in the center but to the right is a separate numeric keypad like that on an adding machine, and to the left are 10 special-function keys. The keyboard is connected to the back of the base unit by a six-foot long coiled cable which allows you to move the keyboard independently to a comfortable position around the base unit.

GETTING TO KNOW THE SYSTEM

To see what commands you have entered into the computer and what responses the computer gives, you also need a monitor. For the highest quality display, a monitor designed for computers is best, but a black and white or color television can also be used.

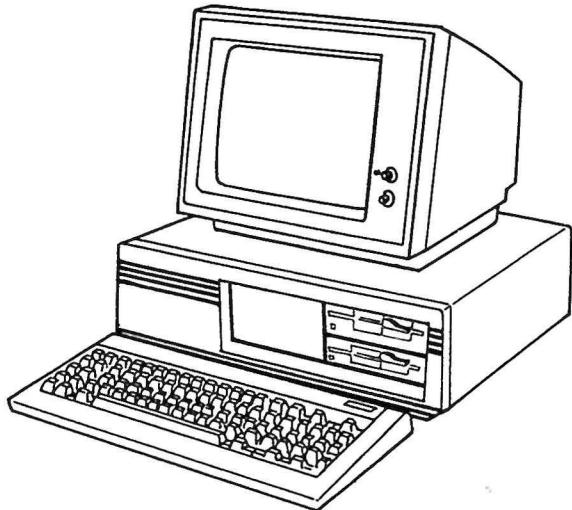


Figure 1.1 The Base Unit

1.3 THE FLOPPY DISK CONTROLLER

The controller supports two double sided, double density, 5 1/4 inch floppy disk drives (See Figure 1.2). A simple 34-conductor flat ribbon cable is used to connect the system board at J10 to the floppy disk drive.

1.4 THE FLOPPY DISK DRIVE

The floppy disk drive writes data sent by the controller onto a floppy disk. The use of floppy disks for data storage has several advantages:

GETTING TO KNOW THE SYSTEM

- 1) The memory in the computer is erased when the computer is shut off. Storing programs and data on a floppy disk provides permanent storage because the disks are not erased when the computer is shut off.
- 2) Each floppy disk can hold 360K of programs or data.
- 3) Floppy disks can easily be transported from computer to computer. One or two floppy disk drives are mounted in the front right of the base unit. Two additional floppy disk drives can be mounted in the front center.

1.5 THE WINCHESTER DISK CONTROLLER CARD

The Winchester disk controller card controls data transfer to and from the Winchester disk. The Winchester controller card performs the same functions as a Winchester disk. The controller card can manage up to 2 Winchester disk drives at once. It resides in one of the expansion slots.

1.6 THE WINCHESTER DISK DRIVE

A Winchester disk drive (See Figure 1.2) stores data in a manner similar to the floppy disk drive except that the disks are permanently mounted inside the unit. Permanent mounting allows the data to be written on the disk more tightly and increases the reliability. The Winchester disk will hold either 10 or 20 Mbytes (megabytes) depending on the model you buy. This is equivalent to about 30 or 60 floppy disks, respectively.

GETTING TO KNOW THE SYSTEM

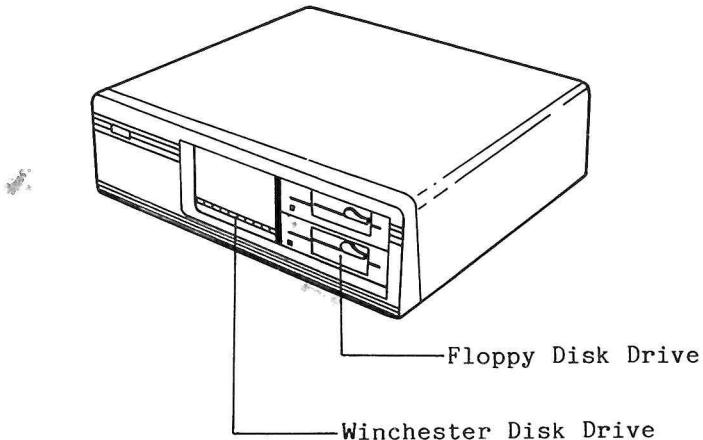


Figure 1.2
Front View of System Showing the Floppy Disk Drives and Winchester Disk Drive

1.7 THE REAL-TIME CLOCK

The real-time clock supports the date and time with a battery back-up feature, it can keep the correct date and time even with the power off.

1.8 PERIPHERALS AND OPTIONS

Peripherals are pieces of equipment attached to the base unit with cables. These generally help in sending information into and out of the computer. This process is referred to as input/output or I/O. The most common peripherals are monitors and printers. Most systems require a monitor and a printer of the user's choice.

GETTING TO KNOW THE SYSTEM

Most options are installed inside the base unit to improve the performance of the system or to support special user applications. Most options advertised for the IBM Personal Computer will be compatible with the system.

1.9 SOFTWARE

Software is a set of instructions which tell the computer what to do. Software for this PC can be broken down into two categories, operating systems and application programs. You will need one from each category to operate your computer.

The operating system instructs the CPU how to control the other parts of this PC. The operating system must be loaded into the computer memory when the system is first turned on. Among those operating systems which may be applied to the Intel 8088-2 chip, two are the most widely used --- MS-DOS 3.2 by Microsoft Inc. and CP/M 86 by Digital Research Corp. We pack MS-DOS with this PC.

Application programs are the instructions you give the computer to accomplish a specific task, to name some of the examples, the packages for word processing, inventory control or programming languages, such as BASIC, PASCAL, or ASSEMBLER, are all popular ones. Application programs are designed to run with a specific operating system. The application programs you choose for your system should be IBM PC compatible.

CHAPTER 2
GETTING READY

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2.4 SETTING UP	2-4

GETTING THE SYSTEM READY

2.1 INTRODUCTION

This chapter tells you how to prepare your PC for use. It also shows you step-by-step how to set up your new personal computer. First of all, you should select a good computer site, then unpack the system and keyboard.

2.2 SELECTING A SITE

The system is a sophisticated electronic system and some precautions must be taken with its handling and care. You should select an area that is clean and has good air circulation to place the computer. The computer should be placed where it will not be bumped or have anything spilled on it.

Before unpacking the computer, clear a flat, stable surface where you will have room to place the computer and have access to all sides. The area should be near an electrical outlet. If the line voltage is unstable in your area, you may want to install a voltage regulator to protect your sensitive computer components.

2.3 UNPACKING

Your PC shipping carton should contain the following items:

- * One AC power cord
- * A binder containing the System User's Guide, an MS-DOS User's Reference Manual, and two 5-1/4" diskettes.
- * The system base unit

GETTING THE SYSTEM READY

Remove everything from the shipping carton. Place the system unit in the middle of the area that you have chosen. Inspect the system unit for any damage that may have occurred during shipping. Notify your dealer or the carrier who delivered the computer if any damage has occurred, and retain the shipping carton. Refer to Appendix D if more information about installing the monochrome or color-graphics adapter is needed.

NOTE

See Appendix C for the power requirements for your system. Do not plug the power cable into the computer at this time.

2.4 SETTING UP

- STEP 1. *Open the floppy disk drive door and remove the cardboard protector inside the floppy disk drive by pulling it straight toward you. Keep the cardboard protector to use if you want to move your computer later (Figure 2.1).*

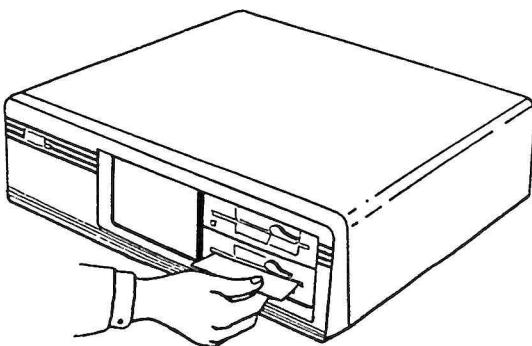


Figure 2.1 Removing the Cardboard Protectors from the Floppy Disk Drives

GETTING THE SYSTEM READY

- STEP 2. Move around to the back of the computer. Place the keyboard near the base unit and plug the keyboard cable into the base unit (Figure 2.2).

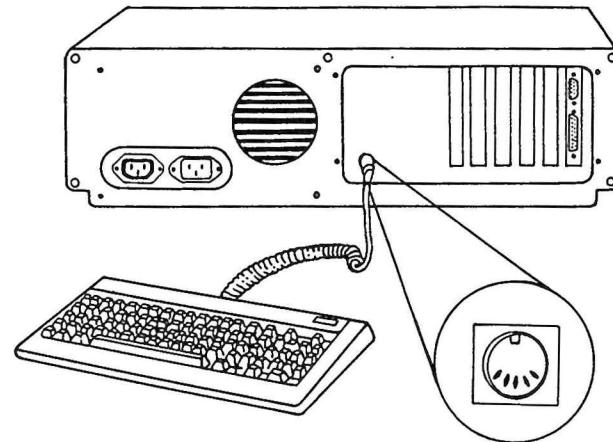


Figure 2.2 Plugging the Keyboard Into the Base Unit

GETTING THE SYSTEM READY

NOTE

Please check the chassis label on the rear panel to make sure of the configuration of the system first. Don't plug the system into a wrong A.C. outlet, i.e. plug a 115V system to a 230V outlet, or plug a 230V system into 115V outlet. Such error will result in catastrophic damage to your system. For detailed information on your system's power requirements, refer to Appendix C.

GETTING THE SYSTEM READY

- STEP 3. Check the 1/0 switch (the power switch) to make sure the switch is in the 0 position. Plug the power cord into the base unit and then into the outlet (Figure 2.3).

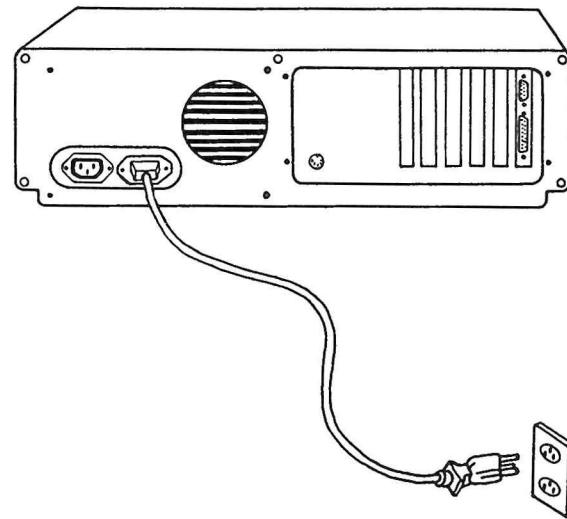


Figure 2.3 With the 1/0 switch in the 0 position, plug the power cord into the base unit and into the outlet

GETTING THE SYSTEM READY

STEP 4. Turn the I/O switch to the 1 position. You should hear one long beep followed by two short beeps. This indicates that the base unit is functioning. If you hear nothing or something other than one long beep followed by two short beeps return the computer to the place of purchase (Figure 2.4).

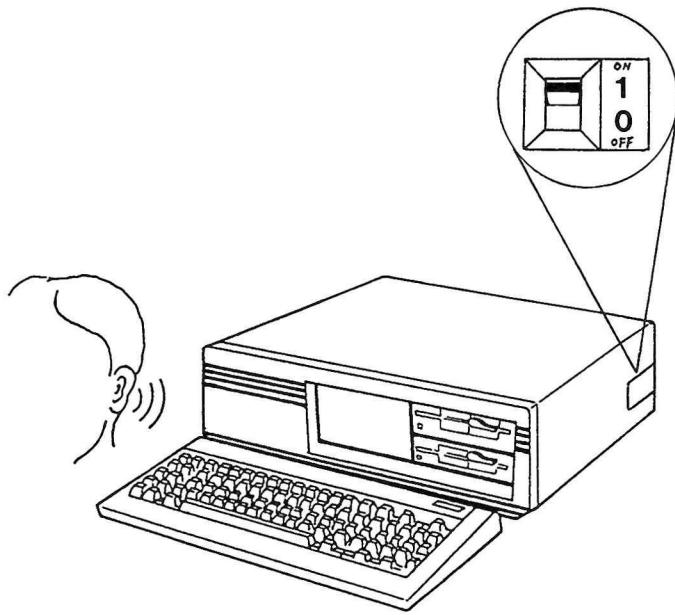


Figure 2.4 Listening for 1 long beep and 2 short beeps

CHAPTER 3

INSTALLING PERIPHERALS AND OPTIONS

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INSTALLING PERIPHERALS AND OPTIONS

3.1 INTRODUCTION

Many peripherals and options are compatible with the system. This chapter will give general instructions for installation of some peripherals, such as monitors and printers. Installation instructions for other peripherals or options will be included with the peripheral or option. You may want to insert these manuals at the end of this section for future reference.

After your PC has passed the initial self test, you can install peripherals such as a monitor or printer. These two peripherals are used on most computer systems and their installation instructions will be explained as completely as possible here. Due to the wide variety of monitors and printers, some generalities in the installation instructions will be necessary. Refer to the manual for your monitor or printer for details.

Most of the necessary connectors for peripherals are already provided on the back panel. These connectors are shown in Figure 3.1.

Remember to install options only when the computer is turned off!

INSTALLING PERIPHERALS AND OPTIONS

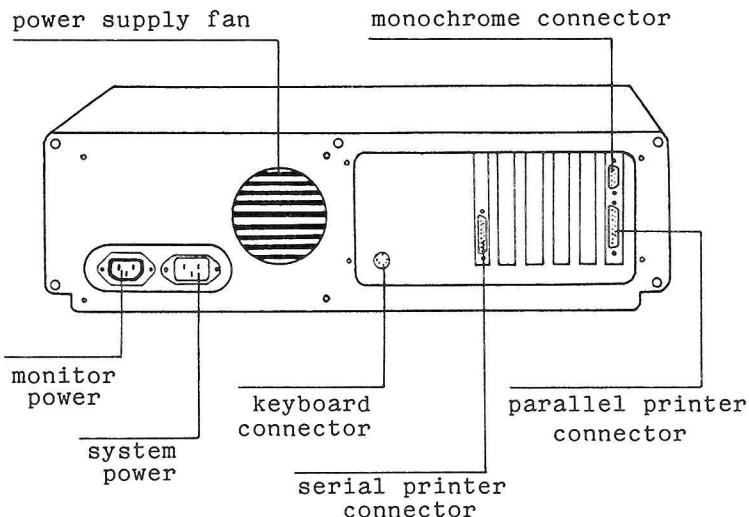


Figure 3.1 Diagram of the PC Rear Panel Showing Power Switch, Option Connectors, etc.

3.2 THE MONITOR

You can use a monochrome monitor or, with an option board, a color/graphics monitor which is capable of doing graphics and can display different colors. A black and white or color television may also be used instead of a monitor. The monitor must be connected to a video display adapter. If you must install an adapter, please refer to Appendix D before going on.

INSTALLING PERIPHERALS AND OPTIONS

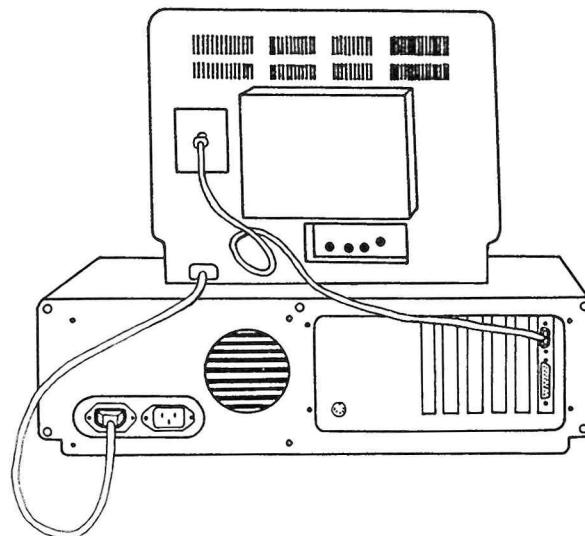
3.2.1 INSTALLING THE MONITOR

MONOCHROME

Place the monitor on the system unit and move the power cable and D-type connector to the rear panel. Then plug the monitor power cable with the male connector into the system unit in the three-pronged outlet on the rear panel and plug the D-type connector into the connector of the monochrome adapter. (See Figure 3.2)

NOTE

The monochrome monitor adapter closely resembles the color monitor adapter. Be sure to connect the monochrome monitor to the correct adapter.



*Figure 3.2
Installing the Monochrome Monitor*

INSTALLING PERIPHERALS AND OPTIONS

COLOR GRAPHICS

If you are using a color graphics monitor, then plug the power cord into a three-pronged outlet, and the D-type connector into the connector of the color graphics adapter. (See Figure 3.3)

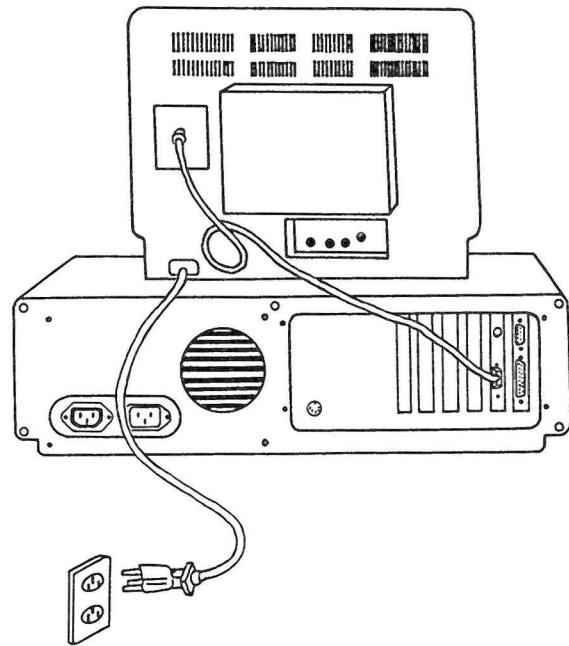


Figure 3.3
Installing the Color Monitor

INSTALLING PERIPHERALS AND OPTIONS

NOTE

Be sure the internal switch is set to the monitor type you want to install. If you change monitor types you must change the switch inside the computer. Please refer to Appendix B for more information on monitor switch settings.

3.3 THE PRINTER

A printer is used with most computer systems to provide "hard copy". Hard copy is a printout of an application program. Hard copy is necessary so that you can have access to your data without having to use the computer each time.

The printer is connected to the computer with a cable. Signals that tell the printer what to print are sent from the computer, through an interface, to the printer. The interface converts the signals from the format used inside the computer (which is different for each computer) into one of the two industry-standard formats used for communication between two pieces of equipment. When the signals reach the printer, the interface converts the computer format into the format used by the printer. Without these interfaces, each printer would have to be matched to each computer.

The two industry standard formats are called Centronics parallel and RS-232C serial. They are called parallel and serial for short. The interfaces in the computer and printer must be the same type, i.e. both parallel or both serial. With most computers today, you may select which of the two interfaces you want when purchasing a printer. The parallel interface is recommended for a printer with this system although a serial interface can also be used. Refer to Appendix D for information on installing the serial/parallel adapter.

INSTALLING PERIPHERALS AND OPTIONS

3.3.1 INSTALLING THE PARALLEL PRINTER

If a cable with a 25-pin male D connector on one end and a 36-pin connector compatible with your printer on the other end was not provided with the printer, obtain one from a retail computer dealer. Unpack and set up the printer following the manufacturer's directions. Make sure both the printer and computer are turned OFF. Plug one end of the cable into the printer and the other end into the parallel connector on the back of the computer (Figure 3.4).

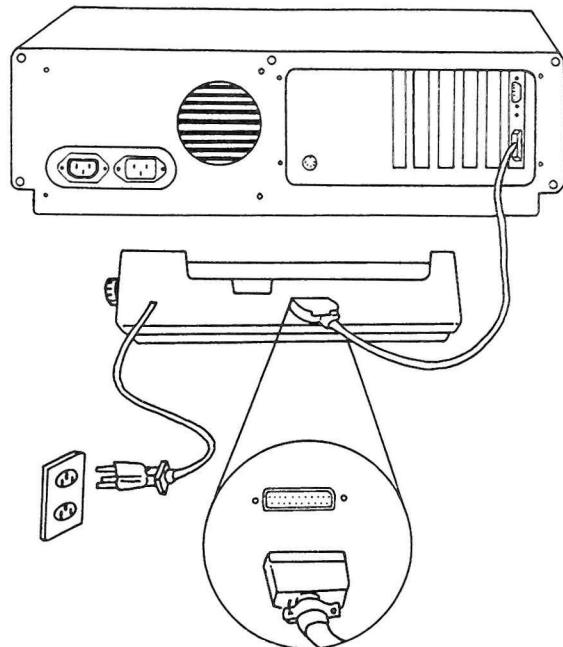


Figure 3.4 Installing a Parallel Printer

INSTALLING PERIPHERALS AND OPTIONS

3.3.2 INSTALLING THE SERIAL PRINTER

Ask your computer and/or printer dealer to get a cable with a 25-pin female D-type connector on each end.

After you have obtained the proper cable, you can install the printer. Unpack and set up the printer following the manufacturer's directions. Make sure both the printer and computer are turned OFF.

Plug one end of the cable into the printer and the other end into the serial connector on the back of the computer (Figure 3.5).

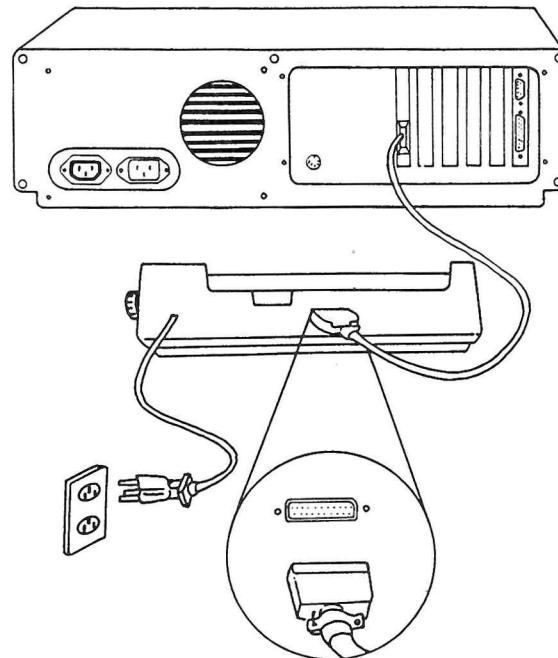


Figure 3.5 *Installing the Serial Printer*

INSTALLING PERIPHERALS AND OPTIONS

3.4 THE REAL-TIME CLOCK AND THE "CLS" COMMAND

Here we will show how to use your DOS diskette to set and use the real time clock.

1. Insert the DOS diskette into drive A.
2. Type the following after the DOS prompt:

```
A> COPY CON: CONFIG.SYS  
DEVICE = TIMER.SYS  
DEVICE = ANSI.SYS  
^Z
```

3. Hold down the [Ctrl] and [Alt] keys and press the [Del] key to reboot your system.

Upon completing these steps you should get the current date and time each time you boot with your DOS diskette.

NOTE

1. Type DEVICE=ANSI.SYS where it is the standard ANSI code for the "CLS" command to work correctly.
2. Don't forget to press [Return] at the end of each line when you are typing.

CHAPTER 4
OPERATING THE SYSTEM

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OPERATING THE SYSTEM

4.1 INTRODUCTION

To use any application programs, you must know how to turn the computer on and off and load the operating system. You will also need to know how to use the keyboard and floppy disk drive. This section will introduce the basics of operating your system, however, it is recommended that you read the manual completely before using the system.

4.2 TURNING THE SYSTEM ON AND OFF

Turn on any peripherals such as the monitor if it is not plugged into the video power connector of the base unit and the printer. Always turn the peripherals on first, then turn the base unit on.

Each time you turn the system on, it automatically performs a power on self test. You can press any key to cancel this test. The amount of time the self test takes depends on the amount of memory in the computer. Items checked by this test include CPU card, memory, monitor, keyboard, and disk drive. You should get the following responses when you first turn the computer on.

1. *An introductory prompt listing the power-on self tests will appear on the monitor.*
2. *You will hear 2 beeps after the memory is tested.*
3. *The "BIOS" prompt will appear.*

OPERATING THE SYSTEM

*Phoenix ROM BIOS Ver 2.13 (R1.03)
Copyright 1984, 1985 Phoenix Software Associates Ltd
All Rights Reserved*

Figure 4.1 Introductory Power-on Self Test Prompt

*Microsoft (R) MS-DOS (R) Version 3.20 (R3.03)
(C) Copyright Microsoft Corp 1981-1986*

*Current date is Tue 1-01-1980
Enter new date (mm-dd-yy):
Current time is 0:00:08.78
Enter new time:*

A>

Figure 4.2 The MS-DOS Prompt

If you do not receive the correct responses when you turn on the computer, refer to chapter 7, "Troubleshooting".

OPERATING THE SYSTEM

The first time you turn on the computer you may need to adjust the brightness and hold before you can see the monitor display. Refer to the monitor manual for these adjustments. If you are using a television, you may also need to change the display from 80 columns wide to 40 columns wide so that you can read the text. The resolution for text on some televisions is poor. (See Appendix B for instructions on how to change the internal switch to alter the monitor type or display mode)

When you have finished using the system, turn the equipment off in the opposite order as you turned it on, i.e. computer off first, and then peripherals off. If you are printing, you shouldn't turn off the computer until the printing is complete. Any information contained in the computer memory will be lost when the computer is turned off. To keep any information, you must save it on a disk before turning off the computer.

4.3 FLOPPY DISKS

Floppy disks are used to permanently store information that you use with the computer because the computer forgets everything when it is turned off. Floppy disks are also used by software companies to distribute software that you purchase.

A floppy disk is a mylar circle coated with a magnetic substance. This circle, the disk, is permanently enclosed in a protective square jacket. The floppy disk is inserted into a floppy disk drive to be used. The floppy disk drive has a spindle which spins the disk inside its jacket. A head strikes the disk through the head slot to read or write information on the disk. The recording process is somewhat similar to that applied to a cassette tape. Refer to Figure 4.3 for the parts of a floppy disk.

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This PC disk drive uses double-sided, double-density, soft-sectored 5-1/4-inch floppy disks. You do not need to understand these terms but must be sure that the disks you prepare for your computer meet these specifications.

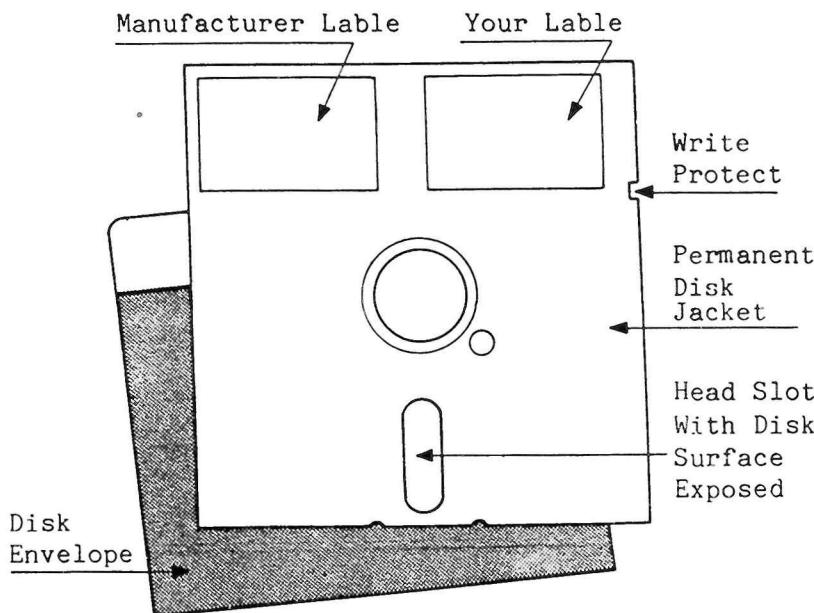


Figure 4.3 A Floppy Disk

OPERATING THE SYSTEM

4.3.1 How Information Is Stored on Floppy Disks

Information is written onto the floppy disk in tracks, sectors, and bytes. The tracks and sectors are a filing system which is used by the head to rapidly move to the spot on the disk where the information is stored, much like a postman uses the street name and house number to deliver mails. Bytes are groups of bits put together that can make words or numbers stored on disks.

The disk is divided into 40 tracks of even size. The tracks are numbered 0 through 39. Track 0 is used by the operating system as a 'directory' of where all other information is kept on the disk. Each track is further subdivided into 9 sectors. One sector is the amount of information that can be passed from the disk to the computer or the computer to the disk at one time.

Each sector is 512 bytes long. A byte can hold exactly one character. This character could be a letter, a number, a space, or a punctuation mark. Each disk will hold 362,496 bytes or about 360 pages of text.

Normally, you do not need to know the track and sector numbers where your information is stored on the disk. You give the information you want to be stored a 'file name' and the operating system stores your file name with the track and sector numbers of your information in the directory on track 0. So, when you want to use your information again, you just type the file name and the computer will automatically find the information on the disk for you.

OPERATING THE SYSTEM

4.3.2 Maintaining Floppy Disks

Some precautions must be observed when handling floppy disks or you risk losing some of the information stored on your disk.

- * *Do not touch the exposed surfaces of the disk through the head slot.*
- * *Do not bend or fold the disk. Insert the disk carefully into the floppy disk drive so that it does not catch and bend.*
- * *Protect the recording surfaces from dust and scratches by placing the disk in an envelope as soon as you remove it from the disk drive.*
- * *Do not use a ball point pen to write on the disk label. Use a felt tipped pen and press lightly.*
- * *Do not lay heavy objects on top of a disk.*
- * *Store the disk away from heat and magnetic fields. Keep out of direct sunlight. Do not lay near color monitors, telephones, dictating equipment, or electronic calculators.*
- * *Do not smoke near disks. Particles of smoke will spread on the disk surface and make information on the disk unstable.*

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Besides protecting your disks from physical damage, you can also protect your disks from accidentally being erased while in the disk drive. This is called 'write protecting'. Most disks contain a write-protect notch on the upper right edge (See Figure 4.3). When this notch is visible, the disk drive is free to both read and write to the disk. Occasionally, you, or someone else, may accidentally write over information that you need. This will permanently erase the previous information. By placing a tab supplied with the disk over the write-protect notch, the disk drive can only read information, it can not write on the disk. This protects your information from being erased.

Some software suppliers provide programs on disks which do not have write-protect notches. This means you can not destroy the previous information on the disk by writing on it.

4.3.3 Loading a Floppy Disk

With the disk face-up (label up) and the head slot away from you, push the disk all the way into the slot in the disk drive. Close the door by turning the lever downward. Whenever the disk is being used by the computer, the red light on the disk drive will be handled. Do not remove the disk until the light is put out. To remove a disk from the drive, turn the lever to the open position and pull the disk toward you.

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4.4 KEYBOARD

You use the keyboard to control the operation of the computer. The central part of the keyboard looks and operates much like a typewriter keyboard. On either side of the central part are special keys that aid you in operating the computer.

The keys on the right can be used as a numeric pad to enter numbers like on an adding machine or the keys can be used to move the cursor around on the display. The function keys on the left, numbered F1 through F10, are defined by either the operating system or by the program. These functions will change each time you use a different program. Each operating system or program will explain the use of the special function keys.

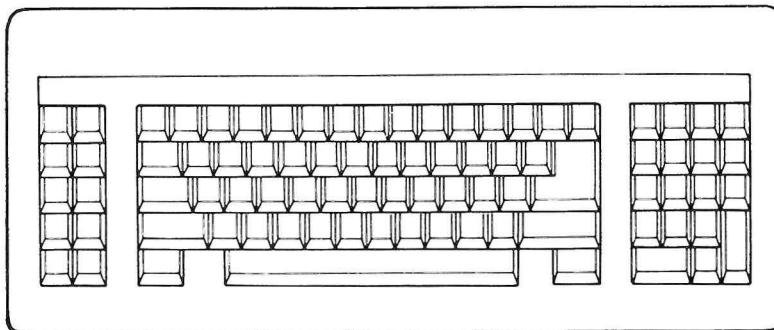


Figure 4.4 Keyboard Layout

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The system keyboard layout is divided into three groups:

- 1) The standard typewriter keys
- 2) The special-function keys
- 3) The numeric keypad (which is combined with the cursor control keys)

There are also three status lights on the Capital (Caps) Lock, Numeric (Num) Lock, and the Scroll Lock keys. These keys only work when their status lights are on.

4.4.1 THE STANDARD TYPEWRITER KEYS

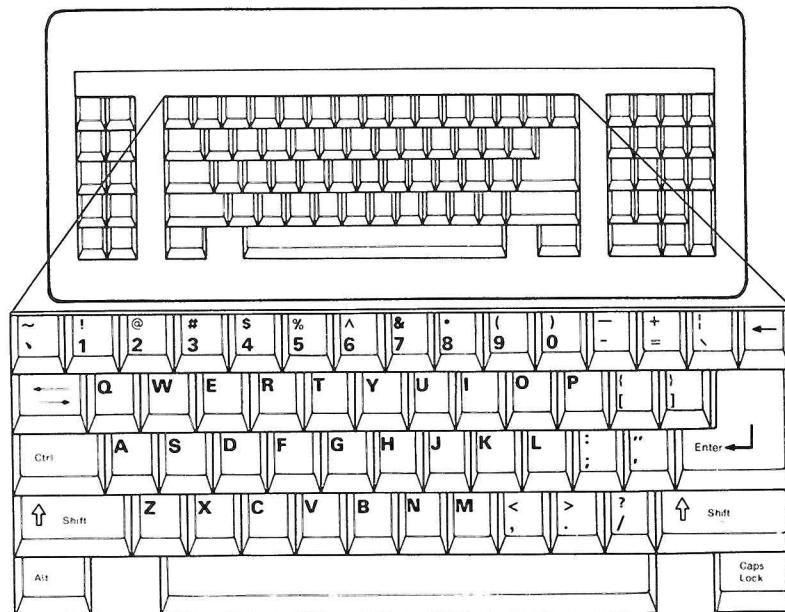


Figure 4.5 Typewriter Keys

These keys are arranged just like those on a standard typewriter and are used in much the same way. If you press a key and hold it down the key will automatically repeat.

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[Alt] key

The Alternate [Alt] key works as a shift key to alter the meaning of another key. The nature of the change will depend on the application program you are using.

Control [Ctrl] key

The control key acts as a shift key to modify the meaning of another key. For example, the combination of [Ctrl] and [Break] (Scroll Lock) is used to stop a job.

[Caps Lock] key

Pressing the [Caps Lock] key once turns on its status light and changes the letter keys A through Z to uppercase letters. When in use it reverses the function of the shift keys. It can't be used to type the symbols on the tops of the other keys. Pressing the [Caps Lock] key again turns the key off, and the status light will go off.

[Enter] key

This key works similarly to the carriage return of a typewriter. It moves the cursor to the start of a new line. Usually the [Enter] key is used to indicate that the system has accepted what you have just typed.

[Backspace] key (←)

This key erases mistakes. Each time you press it, it will move the cursor one space to the left and with most programs it will erase the character in that position.

[Tab] key (↔)

This key moves the cursor to the next tab stop. The tab stops are set automatically at every 8 columns. If you press the [Backspace] key and the [Tab] key simultaneously, the cursor will move back to the previous tab stop.

[Shift] key

There are two shift keys on your keyboard, pressing either one of them will shift the letter keys, the symbol keys, and the numeric keypad from lowercase to uppercase. But when the

OPERATING THE SYSTEM

[Caps Lock] key is in use the [Shift] key reverses its function and changes the keys from uppercase to lowercase.

[Space bar]

The space bar moves the cursor one space to the right. With most programs the character will be erased if you space over it.

NOTE

When entering data, you should note that the zero [0] key and the letter [O] key, and the number one [1] key and the lower case letter [l] key are not interchangeable.

4.4.2 THE SPECIAL FUNCTION KEYS

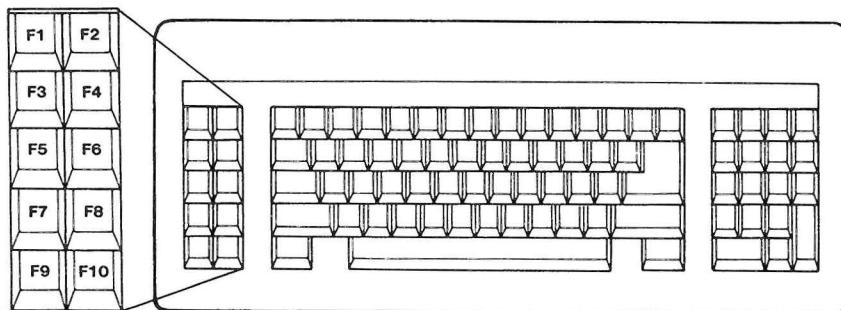


Figure 4.6 Function Keys

The ten function keys, [F1] - [F10], are multi-purpose keys and their function will depend on the application program you are using. For more detailed information about the MS-DOS function keys, please refer to section 4.16.

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4.4.3 THE NUMERIC KEYPAD

The numeric keypad is useful when entering data that contains many numbers and doing many calculations. Besides the numbers some keys also have functions. The purposes of these keys are detailed below.

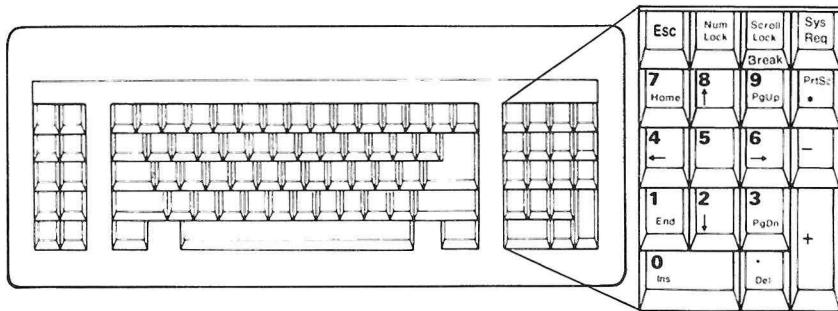


Figure 4.7 The Numeric Keypad

[Num Lock] key

Pressing the [Num Lock] key once turns on its status light and switches the cursor keys to number keys. The shift keys will work in reverse when the [Num Lock] key is in use. Pressing the [Num Lock] key a second time will return the numeric keys back to cursor control and the status light will go off.

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[Scroll Lock] key

Pressing the [Scroll Lock] key once will activate the key. The status light will come on and the Cursor Up and Down keys will move the text up or down while the cursor remains on the same line. The [Scroll Lock] key also doubles as a [Break] key. It is often used with the [Ctrl] key to stop a job.

[Prtsc] key

When you press the print screen [Prtsc] key, it will display a ''. If you press the [Shift] key and the [Prtsc] key simultaneously, the data on the screen will be printed exactly as it appears on the screen (e.g. all commands will be printed with the data).*

[Ins] key

This key is used to insert data in a line. Press [Ins] once to use the insert mode, and the cursor will verify the mode by blinking. Pressing the key a second time will disable the insert mode.

[Del] key

When the [Num Lock] key is in operation the [Del] key will type a decimal point. Otherwise its function is to erase the character in the cursor position.

[+], [-] keys

The two keys display a (+) and a (-) respectively when pressed.

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4.4.4 CURSOR CONTROL KEYS

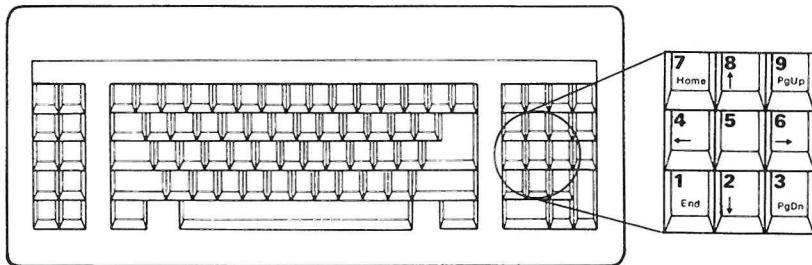


Figure 4.8 Cursor Control Keys

The function of each key depends on the program you are using.

[End] key

This key moves the cursor to the right of the last character on the line. When the [Num Lock] key is in use, it types a '1' instead.

[Home] key

This key moves the cursor to the top left corner of the screen. When the [Num Lock] key is in use, it types a '7' instead.

[Pg Up] key

When you press the [Pg Up] key, the displayed material skips up to the preceding page. If you hold down the [Alt] key and press the [Pg Up] key, you can review the previous chapter.

OPERATING THE SYSTEM

[Pg Dn] key

When you press this key, the displayed material skips to the next page. If you want to skip to the next chapter, hold down the [Alt] key and then press the [Pg Dn] key.

[↑] key

This key moves the cursor up one line at a time.

[↓] key

This key moves the cursor down one line at a time.

[→] key

This key moves the cursor to the right one space at a time.

[←] key

This key moves the cursor to the left one space at a time.

4.5 SPECIAL FUNCTIONS WITH THE KEYBOARD

4.5.1 The letter "O" / the number 0 keys and the letter "1" and the number 1 keys

The central part of the keyboard looks just like a typewriter and, for the most part, is used just like a typewriter. But for those who are used to a portable typewriter, you will have to break a couple of habits. The letter O and number 0 and the letter 1 and number 1 are not interchangeable on a computer. A computer can not add the letter "l" to 5 and get 6.

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4.5.2 Space Bar

The computer is also fussy about spaces. A space is treated just like the letter A or B. If you leave a space in the middle of a command and the computer does not expect a space to be there, the computer will not recognize the command. Conversely, if the computer expects a space, it should be there.

Follow the format of commands given here and in the DOS manual carefully.

4.5.3 Caps Lock Toggle

[Caps Lock] makes all letters that you type come out in uppercase. To use [Caps Lock], press the key once. If you use the shift key with [Caps Lock] engaged, the letter will be lowercase. To turn off [Caps Lock], press the key a second time. Use of the right shift key will not turn the [Caps Lock] off any longer than it is pressed.

4.5.4 Keys to Move Cursor

The space bar and back space keys are the keys used on a typewriter to move to the place you want to type. On the computer these keys not only move the cursor back and forth but also erase everything as they go.

Under some application programs, if you spot a misspelled word, you can use the ← and → keys on the numeric keypad to the right to move the cursor without erasing other letters along the way. When you get the cursor placed under the misspelled letter, just press the correct key and it will overwrite the misspelled letter. You can make as many changes in a line as you want until you press [Return]. If you want to erase a line to start over before you press return, press the Esc key. A backslash (\) will be displayed and the cursor will move to a new line so that you can start over.

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4.5.5 Num Lock Toggle

Normally in DOS you will use the numeric keypad for cursor control. If you have a lot of numbers to type, you can press the [Num Lock] key and the numeric keypad will then display numbers when the keys are pressed instead of moving the cursor. The numbers on the numeric keypad are identical to the numbers across the top of the keyboard. To return to cursor control, just press [Num Lock] a second time.

4.5.6 Stopping A Command

Hold the [Ctrl] key down and then press the [Scroll Lock /Break] key. Release both keys. This will cause the command that is currently being executed to stop immediately. The command in progress will not be completed. The DOS prompt will be displayed and you can then enter your next command.

4.5.7 Stopping the Screen from Scrolling

If you enter a command to display information on the monitor and the display takes more than 1 screen, information will be lost at the top of the screen as more information is displayed at the bottom. This method of displaying information is called scrolling. If the information moves so fast on the monitor that you do not have time to read it, you can hold down the [Ctrl] key and press [Num Lock]. This will cause the scrolling to stop. When you have read the information, press any key to start scrolling again.

4.5.8 Printing the Text Displayed on the Screen

If you would like to keep a copy of information displayed on the monitor, you can hold down the [Shift] key and press [PrtSc]. A copy of the information on the monitor will be printed on your printer. You must have a printer attached and turned on.

OPERATING THE SYSTEM

4.4.9 Printing Whatever Is Displayed On The Screen

This function is similar to the one above with the exception that each line is printed on the printer as it is displayed on the monitor. This includes commands that you enter. Hold down the [Ctrl] key and press [PrtSc], then release both. The next line, and all following lines before you press [Ctrl] and [PrtSc] again, will be printed when they appear on the monitor.

4.5.10 System Reset

If you want to start DOS over again from the very beginning, insert the DOS diskette into drive A. Hold down both [Ctrl] and [Alt] and then press [Del]. Release all keys. After a short time, you will see the DOS start-up message.

4.5.11 Function Keys

The function keys on the left of the keyboard are used in DOS to edit commands within a line before [Return] is pressed. The function of each key is summarized on section 5.14. For complete information of their functions under MS-DOS, refer to the DOS manual. Their functions will vary with different application programs.

CHAPTER 5

USING DOS

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5.6 FORMATTING NEW DISKETTES	5-9
5.7 BACKING UP THE DOS DISKETTE	5-13
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USING DOS

5.1 AN INTRODUCTION TO DOS

MS-DOS is the operating system that your computer uses. It is a collection of programs that control the computer and acts as an interface between your application programs and the machine. DOS stands for **Disk Operating System** and it is an important part of your system.

You must have an operating system loaded into your computer to accomplish nearly every task. The basic functions of DOS will be introduced in this chapter. For more detailed features, please refer to the MS-DOS User's Reference Manual.

5.2 STARTING DOS

Starting or loading DOS means to copy DOS programs into the computer memory. Remember that the computer forgets everything when it is turned off.

5.2.1 STARTING DOS WHEN THE COMPUTER IS OFF

1. Insert the DOS diskette into the disk drive A and close the drive door.
2. Turn on the peripherals (monitor, printer,...etc.), then the computer.
3. After a short pause, the indicator light will come on indicating that the computer is reading the DOS programs into memory.

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5.2.2 STARTING DOS WHEN THE COMPUTER IS ON

1. Insert the DOS diskette into the disk drive A and close the drive door. If the DOS you want to boot is on the hard disk drive, leave the door of drive A open.
2. Hold down the [Ctrl] and [Alt] keys and then press the [Del] key to re-start the system.
3. After a short pause, the red light on the disk drive A or drive C will come on indicating that the DOS programs are being read into memory. Any information previously in the memory will be erased.

5.2.3 CHANGING THE DATE AND TIME

You can enter the time and date to maintain your file under the MS-DOS operation.

You may enter the time and date in different ways if you wish. To enter a new date, type the word "date" followed by a space, two numbers for the month, a dash (a period or a slash may also be used), one or two numbers for the day, another dash, and two or four numbers for the year. Then press the [Enter] key. Your entry will look something like this:

04/12/86 or 04-12-86 or 04.12.86

MS-DOS checks the entry to make sure that it is valid. If it is invalid you will be given another chance.

**Invalid Date
Enter New Date:_**

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To enter a new time, type the word "time" followed by one or two numbers for the hour (the system clock uses 24 hours instead of 12), a semi-colon, one or two numbers for the minutes, a semi-colon, and one or two numbers for the seconds. Then press the [Enter] key. MS-DOS will check your entry. If it is invalid, you will be asked to enter again.

NOTE

You must press the [Enter] key at the end of the line, so the computer will know you've completed your entry.

5.3 NOTATION

When you are working in DOS and DOS is waiting for your command, you will see an A> at the far left side of the monitor followed by a flashing cursor. This is called the **DOS prompt**. When entering the command, what you type will appear in the cursor position. The [Enter] key must be pressed before the command is carried out. You can enter the command in uppercase letters, lowercase letters, or any combination thereof. In this chapter file names and DOS messages will be shown in boldface letters.

5.4 ACCESSING DISK DRIVES

The DOS prompt also tells you which disk drive is the default drive. The default drive is used by DOS to carry out your commands.

To change the default drive, enter the letter of the desired drive followed by a colon after the DOS prompt.

A>b:

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The DOS prompt will be changed to:

B>_

indicating the default drive is now B.

5.5 PLACING DOS ON A FIXED DISK

Before using the fixed disk you must copy the contents of your DOS diskette onto your fixed disk. We will use three DOS commands, **FDISK**, **FORMAT**, and **COPY**, to place DOS on the fixed disk.

1. To start Fdisk, type:

fdisk

and press the [Enter] key. Fdisk will display its main menu on the screen:

**Fixed Disk Setup program Version 0.01
(C) Copyright Microsoft, 1985, 1986.**

Fdisk options

Choose one of the following:

- 1. Create DOS Partition**
- 2. Change Active Partition**
- 3. Delete DOS Partition**
- 4. Display Partition Data**
- 5. Select Next Fixed Drive**

Enter choice:

Press ESC to return to DOS

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If your computer does not have more than one fixed disk, choice 5 will not appear on this menu.

Pressing the escape [Esc] key will return you to the main menu from any of the Fdisk screens.

2. We will choose [1] for creating a DOS partition, Fdisk will display the following screen:

Create DOS partition

Current Fixed Disk Drive: 1

**Do you wish to use the entire fixed drive for DOS
(Y/N)?**

If you want to use the entire fixed disk for MS-DOS, press the [Enter] key to accept the default setting, Y. Fdisk will display the message:

System will now restart

Insert DOS diskette into drive A:

Press any key when ready...

You should insert your MS-DOS disk into drive A and press any key to restart MS-DOS.

- 3.** Now you have created your DOS partition, you must format your fixed disk so that MS-DOS can use it. (Refer to the MS-DOS manual for more information on formatting your fixed disk).
- 4.** The DOS diskette should be loaded from drive A and the **A>** should appear on your screen.
- 5.** Now type **COPY *.* C:** and press [Enter]. This command causes a copy of each file on your DOS diskette. Your screen will look like this:

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```
COPY.* C:  
COMMAND.COM  
ANSI.SYS  
DRIVER.SYS  
RAMDRIVE.SYS  
DEBUG.EXE  
CHKDSK.EXE  
SYS.EXE  
EDLIN.EXE  
RECOVER.EXE  
PRINT.EXE  
DISKCOMP.EXE  
LABEL.EXE  
LINK.EXE  
FORMAT.EXE  
SORT.EXE  
MORE.COM  
APPEND.EXE  
FIND.EXE  
MODE.COM  
TREE.EXE  
XCOPY.EXE  
EXE2BIN.EXE  
FC.EXE  
GRAPHICS.COM  
GRAFTABL.COM  
FDISK.EXE  
ASSIGN.COM  
SHARE.EXE  
ATTRIB.EXE  
JOIN.EXE  
SUBST.EXE  
DISKCOPY.EXE  
REPLACE.EXE  
HFMT.COM  
T5.COM  
T8.COM  
SHIPKIT.COM  
TIMER.SYS
```

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CONFIG.SYS

39 File(s) copied

NOTES

1. *Two MS-DOS system files, IO.SYS and MSDOS.SYS are "hidden" files and will not appear when you issue the "Dir" command.*
2. *You have two DOS diskettes. Be sure to repeat the process with the second diskette so all the DOS files are read into the hard disk.*

Now your hard disk is ready for use. For more detailed information on using the hard disk, please refer to the MS-DOS manual.

5.6 FORMATTING NEW DISKETTES

Blank diskettes can't be used to store information before they are formatted. This process (called formatting) prepares a new diskette for use in your PC.

Type FORMAT (the format command) and DOS will check the new diskette to make sure its recording surface is usable, then it will create a directory to prepare the diskette to store information.

WARNING

Never format a diskette that contains information that you want to keep. When you format a diskette you will destroy all the information previously stored on it.

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5.6.1 FORMATTING WITH ONE FLOPPY DRIVE

1. The DOS diskette should be loaded in drive A and the A> should appear.
2. Type **format /s** and press the [Enter] key. The screen will display the following message:

```
A>format /s  
Insert new diskette for drive A:  
and strike ENTER when ready
```

3. Remove the DOS diskette and insert a blank diskette into drive A. Then close the drive door and press any key. The screen will display the following message:

```
Head: 0 Cylinder: 0
```

When all 40 tracks have been formatted (0-39), the screen shows you the capacity of the diskette, the number of damaged or bad sectors, if any, and the total amount of space available (bytes) on the diskette for your use:

```
Format Complete  
362496 bytes total disk space  
68608 bytes used by system  
293888 bytes available on disk
```

```
Format another (Y/N)?
```

4. If you want to format another diskette for later use, remove the just formatted diskette from disk drive A, then type "Y" for yes and press the [Enter] key to continue formatting. When you have finished formatting diskettes, type "N" to terminate the process. Be sure to replace the formatted diskettes in their envelopes and mark the diskette labels with a felt-tip pen.

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5.6.2 FORMATTING WITH TWO FLOPPY DRIVES

1. The DOS diskette should be loaded in drive A and the A> prompt should appear.
2. Type **format b:/s** and press the [Enter] key. The screen will display a message as follows:

```
A>format b:/s
Insert new diskette for drive B:
and strike ENTER when ready
```

3. Insert a blank diskette into drive B. Then close the drive door and press any key. The screen will display the following message:

```
Head: 0 Cylinder: 0
```

When all 40 tracks have been formatted (0-39), the screen shows you the capacity of the diskette, the number of damaged or bad sectors, if any, and the total amount of space available (bytes) on the diskette for your use:

```
Format Complete
362496 bytes total disk space
 68608 bytes used by system
293888 bytes available on disk
Format another (Y/N)?
```

4. If you want to format another diskette for later use, remove the just formatted diskette from disk drive A, then type "Y" for yes and press the [Enter] key to continue formatting. When you have finished formatting diskettes, type "N" to terminate the process. Be sure to replace the formatted diskettes in their envelopes and mark the diskette labels with a felt tip pen.

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5.6.3 FORMATTING WITH ONE FLOPPY DRIVE AND ONE HARD DRIVE

A. Using drive A to format diskettes

This method is identical to the one that has a single disk drive (drive A) and no fixed disk.

B. Using the hard disk to format diskettes

1. The DOS diskette should be loaded in drive A and the **A>** should appear.
2. Type **C:** and press the [Enter] key. The fixed disk prompt **C:** will appear on the screen.
3. Type **format a:/s** and press the [Enter] key. The screen will display the following message:

**Insert new diskette for drive A:
and strike ENTER when ready**

4. Insert a blank diskette into drive A. Then close the drive door and press any key. The screen will display the following message:

Head: 0 Cylinder: 0

When all 40 tracks have been formatted (0-39), the screen shows you the capacity of the diskette, the number of damaged or bad sectors, if any, and the total amount of space available (bytes) on the diskette for your use:

**Format Complete
362496 bytes total disk space
68608 bytes used by system
293888 bytes available on disk**

Format another (Y/N)?

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5. If you want to format another diskette for later use, remove the just formatted diskette from disk drive A, then type "Y" for yes and press the [Enter] key to continue formatting. When you have finished formatting diskettes, type "N" to terminate the process. Be sure to replace the formatted diskettes in their envelopes and mark the diskette labels with a felt-tip pen.

5.7 BACKING UP THE DOS DISKETTE

To keep from losing valuable information due to a diskette failure, back up every important diskette and keep them up to date.

It is a good idea to back up your DOS diskette and use only the back-up diskette for your daily work. Store the original DOS diskette in a safe place. The original DOS diskette should only be used for making more back-ups.

5.7.1 BACKING UP WITH ONE FLOPPY DISK DRIVE

Before making a back-up you should format the blank diskette. When you have formatted the blank diskette, you are ready to transfer all the information on the DOS diskette to it.

1. Remove the back up diskette and insert the DOS diskette into drive A.
2. Type **diskcopy** after the DOS prompt and press the [Enter] key. The following message will be displayed:

**Insert source diskette in drive A:
press any key when ready**

USING DOS

DOS is the "source diskette" and it is already in drive A. Therefore, it is not necessary for you to change diskettes; simply press any key to start the back-up process.

3. *The following message will be displayed:*

***Insert target diskette in drive A:
strike any key when ready***

The back-up diskette is the "target diskette". Remove the DOS diskette and replace it with the back-up diskette, then press any key.

4. *The same message displayed in step 2 will be displayed again:*

***Insert source diskette in drive A:
press any key when ready***

Remove the back-up diskette and insert the DOS diskette, then press any key.

5. *Continue repeating steps 3 and 4 until the following message is displayed:*

Copy another diskette (Y/N)?

6. *Type "N", (You don't have to press the [Enter] key.) A > will appear and the back-up procedure is finished.*
7. *Make a label "DOS diskette Back-Up" and apply it to the back-up diskette. If you write directly on the diskette, use a felt tipped pen and press lightly.*

USING DOS

5.7.2 BACKING-UP WITH TWO FLOPPY DISK DRIVES

After formatting a blank diskette, follow the steps listed below to back up the DOS diskette:

1. Type **diskcopy a: b:** after the DOS prompt and press the [Enter] key. The following message will be displayed:

**Insert SOURCE diskette in drive A:
Insert TARGET diskette in drive B:
Press any key when ready**

DOS is the "source diskette" and is already in drive A. The back-up diskette is the "target diskette" which is in drive B. Simply press any key.

2. Shortly the following message will be displayed:

Copy another diskette (Y/N)?

3. Type "N" (you don't have to press the [Enter] key) and when the A> appears and the back-up procedure is finished.

4. Make a label "DOS diskette Back Up" and apply it to the back-up diskette. If you write directly on the diskette, use a felt-tip pen and press lightly.

5.7.3 BACKING UP WITH ONE FLOPPY DRIVE AND ONE FIXED DISK DRIVE

A. Using Drive A To Back Up

This method is identical to the one that has a single floppy disk drive (drive A) and no fixed disk.

USING DOS

B. Using The Fixed Disk To Back Up

1. The DOS diskette should be loaded into drive A and the "A>" prompt should appear on the screen.
2. Type **C:** and press the [Enter] key, the fixed disk prompt "**C:**" will appear on the screen.
3. Replace the DOS diskette in drive A with one of the new diskettes you have formatted.
4. Type **copy *.* a:**. As each program or file is copied its name appears on the screen. When the copy is completed, your screen should look like this:

```
COPY *.* A:  
COMMAND.COM  
ANSI.SYS  
DRIVER.SYS  
RAMDRIVE.SYS  
DEBUG.EXE  
CHKDSK.EXE  
SYS.EXE  
EDLIN.EXE  
RECOVER.EXE  
PRINT.EXE  
DISKCOMP.EXE  
LABEL.EXE  
LINK.EXE  
FORMAT.EXE  
SORT.EXE  
MORE.COM  
APPEND.EXE  
FIND.EXE  
MODE.COM  
TREE.EXE  
XCOPY.EXE  
EXE2BIN.EXE  
FC.EXE
```

USING DOS

GRAPHICS.COM
GRAFTABL.COM
FDISK.EXE
ASSIGN.COM
SHARE.EXE
ATTRIB.EXE
JOIN.EXE
SUBST.EXE
DISKCOPY.EXE
REPLACE.EXE
HFMT.COM
T5.COM
T8.COM
SHIPKIT.COM
TIMER.SYS
CONFIG.SYS

39 File(s) copied

C>

5. Make a label "DOS Diskette Back-Up" and apply it to the back-up diskette. If you write directly on the diskette, use a felt-tip pen and press lightly.

NOTES

1. Two MS-DOS system files, IO.SYS and MSDOS.SYS are "hidden" files and will not appear when you issue the "Dir" command.
2. You have two DOS diskettes. Be sure to repeat the process with the second diskette so all the DOS files are read into the hard disk.

USING DOS

5.8 EDLIN - CREATING FILES

MS-DOS comes with a program called *EDLIN.COM*. This program is a line editor. You can create files with *EDLIN* and you can edit (modify) the files.

Let's assume you want to create a file named "invite.txt" on the default drive. The file will contain the following lines:

*Tweedledum and Tweedledee
graciously asked Alice
to join them for lunch
on Tuesday.*

The following example shows you how to start *EDLIN*, create the file, and exit *EDLIN*.

For example:

To create this file using *EDLIN*, follow these steps:

1. Make sure the MS-DOS disk is in drive A.
2. Type

edlin invite.txt

3. When you see the asterisk (*), type

i

(for "insert") and press the Return key.
You will see line number 1.

4. Type the following lines. Remember to press the Return key after each line, including the last line.

USING DOS

*Tweedledum and Tweedledee
graciously asked Alice
to join them for lunch
on Tuesday.*

NOTE

*If you make a mistake
Use the Backspace key to erase a mistake
on a line before you press the Return
key.*

5. Your screen should look like this:

*i

*1: Tweedledum and Tweedledee
2: *graciously asked Alice
3: *to join them for lunch
4: *on Tuesday.*

6. At line 5, press the Control-C key to get back to the EDLIN prompt (the asterisk).

Type

e

(for "end"). You will be returned to the MS-DOS A> prompt.

You now have a file named "invite.txt" on the disk in the default drive. When you type the MS-DOS Dir command, you should see an entry for "invite.txt." you can view the "invite.txt" file by typing

type invite.txt

in response to the A> prompt.

USING DOS

For more information on how to use EDLIN, refer to the MS-DOS User's Reference Manual.

5.9 DIR - FINDING OUT WHAT IS ON A DISKETTE

DOS groups related information and stores it on the diskette in a highly organized manner. These groups of related information are called files.

The DIR command allows you to list the file name, extension, size in bytes, and date of creation or last modification of each file on a diskette. Thus, you can use this information to know how to spell a file name or remember what files are on a seldom used diskette.

1. Start DOS and obtain the DOS prompt.
2. Insert your DOS diskette (or any other diskette you want to see the directory of) into drive A.
3. Type **dir** after the DOS prompt. The directory will be displayed on the screen. Pressing the [Ctrl] key and the "S" key will stop the screen from scrolling. The following is a directory of your DOS diskette.

Volume in drive A has no label

Directory of A:

COMMAND	COM	23769	12-02-85	8:32a
ANSI	SYS	1651	12-02-85	8:32a
DRIVER	SYS	1115	12-02-85	8:32a
RAMDRIVE	SYS	8192	12-02-85	8:32a
DEBUG	EXE	15660	12-02-85	8:32a
CHKDSK	EXE	9435	12-02-85	8:32a
SYS	EXE	3727	12-02-85	8:32a
EDLIN	EXE	7369	12-02-85	8:32a
RECOVER	EXE	4158	12-02-85	8:32a

USING DOS

PRINT	EXE	8291	12-02-85	8:32a
DISKCOMP	EXE	3700	12-02-85	8:32a
LABEL	EXE	1826	12-02-85	8:32a
LINK	EXE	41322	12-02-85	8:32a
FORMAT	EXE	9398	12-02-85	8:32a
SORT	EXE	1911	12-02-85	8:32a
MORE	COM	295	12-02-85	8:32a
APPEND	EXE	5888	12-02-85	8:32a
FIND	EXE	6416	12-02-85	8:32a
MODE	COM	5195	12-02-85	8:32a
TREE	EXE	2831	12-02-85	8:32a
XCOPY	EXE	11200	12-02-85	8:32a
EXE2BIN	EXE	3063	12-02-85	8:32a
FC	EXE	10624	12-02-85	8:32a
GRAPHICS	COM	3111	12-02-85	8:32a
GRAFTABL	COM	1169	12-02-85	8:32a
FDISK	EXE	8173	12-02-85	8:32a
ASSIGN	COM	1536	12-02-85	8:32a
SHARE	EXE	8557	12-02-85	8:32a
ATTRIB	EXE	8247	12-02-85	8:32a
JOIN	EXE	6295	12-02-85	8:32a
SUBST	EXE	2056	12-02-85	8:32a
DISKCOPY	EXE	4329	12-02-85	8:32a
REPLACE	EXE	11650	12-02-85	8:32a
HFMT	COM	662	12-02-85	8:32a
TIMER	SYS	662	12-02-85	8:32a
T8	COM	1978	12-02-85	8:32a
T5	COM	622	12-02-85	8:32a
CONFIG	SYS	20	12-02-85	8:32a
SHIPKIT	COM	835	12-02-85	8:32a

39 File(s)

16384 bytes free

USING DOS

NOTES

1. Two MS-DOS system files, IO.SYS and MSDOS.SYS are "hidden" files and will not appear when you issue the Dir command.
2. You have two DOS diskettes. You may repeat the process with the second to view the contents in the second diskette.

You can either change the default drive to B or just type **dir b:** to see the contents of any diskette on the floppy drive B.

5.10 COPY - BACKING UP ONE FILE

This command is used to copy only one file on a diskette. Perhaps you want to keep a copy of a file before making changes on it or you may want to copy a file to give it to someone or place it on another diskette.

For example, let's assume that you want to make a copy of a file named LETTER. You will copy it to the same diskette and change the name to MEMO.

1. Start DOS and obtain the DOS prompt.
2. Insert the diskette, with the file LETTER on it, into drive A.
3. Type **copy letter memo** and press the [Enter] key.

NOTE

You should enter the original file name first and the new file name second.

USING DOS

- When the copy is finished, the screen will look like this:

1 File(s) copied
A>

You can use the "DIR" command to confirm this new file, MEMO, was created.

Now assume that you have only one floppy disk drive and you want to copy the file LETTER to a different diskette:

- Start DOS and obtain the DOS prompt.
- Insert the diskette with the file LETTER on it into drive A.
- Type **copy letter b:** and press the [Enter] key. The following message will be displayed:

**Insert diskette for drive B
and strike ENTER when ready**

Remove the original diskette and insert the back-up diskette into drive A. Then strike any key when ready.

- If the file is large, you may see the following message:

**Insert diskette for drive A:
and strike any key when ready.**

Remove the back-up diskette and insert the original diskette into drive A, then press any key.

- Repeat steps 4 and 5 until the file is completely copied. When the file is completely copied, you will see the following message:

1 File(s) copied
A>

USING DOS

The file LETTER will now be on both diskettes.

Finally, assume that you have two floppy disk drives and you want to copy the file LETTER to a different diskette.

1. Start DOS and obtain a DOS prompt.
2. Insert the diskette with the file LETTER on it into drive A and insert the back up diskette into drive B.
3. Type **copy letter b:** and press the [Enter] key. The process will start. When the file is copied, you will see the following message:

1 File(s) copied

A>

The file LETTER will now reside on both diskettes.

5.11 RENAME - CHANGING A NAME

This command allows you to change the name or extension of a file without changing any information in the file.

Assume that you have a file named GRAPH and you want it renamed PICTURE.

1. Start DOS and obtain the DOS prompt.
2. Insert the disk with the file you want to re-name into drive A.
3. Type **rename graph picture** and press the [Enter] key.

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NOTE

MS-DOS will only recognize a maximum of eight characters for a file name, followed by an optional period and a three character extension.

After the file is renamed, the DOS prompt will appear.

You can rename files on drive B by changing the default drive. If you want to change the name of a file that is not in the default drive, use the following example:

A> ren [ame] b: graph picture

NOTE

It is best not to rename DOS commands or application programs, because during execution, a program may not be able to find the command it needs to communicate with.

5.12 DEL - DELETING FILES FROM A DISK

This command deletes the files from a diskette that you no longer need and makes room for new files.

Once the file is erased you can't recover it again without creating it from the beginning. So you should use care when deleting files.

Assume the name of the file you want to delete is GRAPH.

1. Start DOS and obtain the DOS prompt.
2. Insert the diskette with the file you want to erase into drive A.

USING DOS

3. Type *DEL graph*, check the spelling, and press the [Enter] key.

After the file is erased, the DOS prompt will appear.

5.13 TYPE - DISPLAYING WHAT IS ON A FILE

This command can be used with most text files and some data files to allow you to view the file contents.

Assume that the name of the file you want to see is LETTER.

1. Start DOS and obtain the DOS prompt.
2. Insert the disk with the file you want to see into drive A.
3. Enter the command **type letter** and press the [Enter] key.

The file will scroll on the monitor. If you want to stop the scrolling, press the [Ctrl] [Num Lock] keys. If you want the file printed, press the [Ctrl] [Prtsc] keys.

The DOS prompt will appear after the file is displayed.

5.14 PRINT - PRINTING FILES ON A PRINTER

This command allows you to print files on a printer. For example, assume that you have written a BASIC program named "sorter.bas" and want to print it on your printer. You could use the command:

Print sorter.bas

USING DOS

For example:

You have created a file of names and phone numbers and want to print the file to store near your phone. The file is named "friends.me" and it is in drive B. Drive A is the default drive (A> is the prompt). To print the "friends.me" file , follow these steps:

1. Make sure that the MS-DOS disk is in drive A.
2. Make sure that the disk with the "friends.me" file is in drive B.
3. Check to see that your printer is on and has paper.
4. In response to the A> prompt, type:

print b:friends.me

5. Press the [Enter] key.

If the MS-DOS disk is not in drive A, MS-DOS will prompt you to insert the master disk in the drive.

5.15 IF YOUR DOS COMMAND DOES NOT WORK

Remember to make back-up diskettes regularly, or you may lose most or all of the information stored on a diskette.

If a DOS command does not work as you expected it to, you may use the following methods to check.

- * Use the [DIR] command to check your spelling of the file name.
- * Use the [DIR] command to check the file extension.

USING DOS

- * Remove the diskette or do a [DIR] file command on the diskette to check if it is the diskette that you want.
- * Check the default drive in the DOS prompt, and check the DOS manual to see how to specify a drive other than the default drive.
- * Refer to the DOS manual for the spelling and spacing of the command.

If the command still does not work, read the DOS manual again.

5.16 MS DOS EDITING KEYS

USING DOS

The keys listed on the following table can be used to create/modify your MS-DOS V3.2 operating system.

KEY	EDITING FUNCTION	KEYBOARD
<COPY1>	COPIES ONE CHARACTER FROM THE TEMPLATE TO THE LINE	[F1]
<COPYUP>	COPIES CHARACTERS UP TO THE CHARACTER SPECIFIED IN THE TEMPLATE AND PUTS THE CHAR- ACTER ON THE COMMAND LINE	[F2]
<COPYALL>	COPIES ALL THE REMAINING CHARACTERS IN THE TEMPLATE TO THE REMAINING LINE	[F3]
<SKIP1>	SKIPS OVER (DOESN'T COPY) A CHARACTER IN THE TEMPLATE	[DEL]
<SKIPUP>	SKIPS OVER (DOESN'T COPY) THE CHARACTERS IN THE TEMPLATE UP TO THE CHARACTER SPECIFIED	[F4]
<VOID>	VOIDS THE CURRENT INPUT; LEAVES THE TEMPLATE UNCHANGED	[ESC]
<INSERT>	ENTERS/EXITS THE INSERT MODE	[INS]
<NEWLINE>	MAKES THE NEW LINE THE NEW TEMPLATE	[F5]
<CONTROL-Z>	PUTS A CONTROL-Z (1AH) END-OF- FILE CHARACTER IN THE NEW TEMPLATE	[F6]

CHAPTER 6
USING APPLICATION PROGRAMS

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6.2 TYPES OF APPLICATION PROGRAMS	6-3
6.3 APPLICATION PROGRAM OPERATIONS	6-4

USING APPLICATION PROGRAMS

6.1 INTRODUCTION

So far you have installed your computer and learned how to use some housekeeping commands in DOS. Now you can use the application programs to do useful tasks and to create files.

After starting DOS, you enter the filename of the application program and its drive location. The program automatically begins working, usually by displaying a menu which allows you to choose one of several options.

When you start entering data, the application program will ask you what name you want the data file to have. Later, when you want to add data to that file, you will be asked to give the filename.

6.2 TYPES OF APPLICATION PROGRAMS

Application programs fall into roughly three categories: tasks, utilities, and programming languages.

Tasks are the most common application programs, including word processors, bookkeeping packages, spread sheets, and games.

Utilities are designed to enhance the operation of your computer. Often these programs operate with the task programs. Utilities include memory disks and printer spooling packages.

The Memory Disk uses part of the RAM memory in the computer as though it were disk storage, and so reading/writing information to and from the disk is very fast.

The printer spooler stores data that is being transferred to the printer in the computer memory, so you can continue to use the computer before printing is completed.

USING APPLICATION PROGRAMS

Programming languages allow you to write your own application programs for the computer, that is, you can use your computer for very specialized tasks.

Generally, application programs are purchased from retail computer dealers or through mail order companies. Make sure the application is designed for the MS-DOS operating system or is compatible with the IBM PC.

6.3 APPLICATION PROGRAM OPERATIONS

Because of the wide variety of application programs, we can only give general instructions on how to start an application program here. Read the manual which comes with the application program for complete details.

6.3.1 STARTING AN APPLICATION PROGRAM

To start an application program, you must first start DOS. Then when an "A>" appears, remove the DOS diskette and put the application diskette in drive A (or drive B). Enter the name of the application program and press return. Assume your application is called WORDTEXT, the command would look like this:

A>wordtext

The application program will load and automatically start. You will probably see a menu on the monitor with several options for you to choose.

USING APPLICATION PROGRAMS

6.3.2 MAKING A SELF-STARTING APPLICATION DISKETTE

- Some application packages have a "set-up" program which allows you to make a self-starting application diskette, i.e., you should not have to start DOS before using the application. The "set-up" program copies the DOS system programs onto the application diskette. If your application diskette does not have such a set-up program, you can easily create your own.

Start DOS and then format a diskette with the "/s" option so that the system files are copied onto the new diskette. Then use the "DOS COPY" command to copy all of the application programs onto the diskette that you just formatted. Please refer to the DOS manual about the DOS copy command "**copy *.***". **DO NOT USE DISKCOPY** to copy the programs.

Then you must create an autoexec.bat file. This file is executed during the DOS start up. Enter four lines of text using the example below. Insert the application program name for WORDTEXT:

```
A>copy con: autoexec.bat  
data  
wordtext  
^Z
```

You can press [F6] to get the ^Z for line four or you can hold down the [Ctrl] key while pressing [z].

Use the DOS TYPE command to check your autoexec.bat file. Enter:

```
A>type autoexec.bat
```

USING APPLICATION PROGRAMS

You will see the file displayed on the monitor.

**data
wordtext**

*If the file is not right, just start over with 'copy con:
autoexec.bat'*

*The self-starting application diskette is now ready to use.
You no longer need to start DOS using the DOS diskette. If
your computer is turned off, insert the self-starting
diskette in drive A and turn on the computer. If the
computer is already on, insert the self-starting diskette
into drive A and press the [Ctrl], [Alt] and [Del] keys.
Usually, the screen will display a menu of options.*

CHAPTER 7
TROUBLE SHOOTING

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7.3 WHAT SHOULD I DO WHEN...?	7-3
7.4 WARNING/ERROR MESSAGES	7-5

TROUBLE-SHOOTING

7.1 INTRODUCTION

This chapter helps you to determine what is wrong if your computer is not functioning properly, and shows you how to fix some simple problems.

7.2 LOCATING THE PROBLEM

When you turn on your computer, you will get three different responses from the computer:

CORRECT RESPONSE

- a) One long beep followed by two short beeps.
- b) Power-on self test prompt.
- c) MS-DOS prompt appears with correct date and time.

If you see and hear these correct responses, the system unit is functioning properly. If a peripheral device is not functioning properly, turn off the computer first, check to make sure that each end of the cable is plugged in tightly, and the power cable for the peripheral is correctly connected, then turn your computer on again.

7.3 WHAT SHOULD I DO WHEN...?

NOTHING HAPPENS WHEN I TURN ON THE POWER

1. Turn the system power off and check the power cords to make sure it is connected properly.
2. Check the wall outlet to make sure it is good.
3. Re-connect the power cord and try turning the system on again.

THE MONITOR DOES NOT WORK

1. Make sure the cable is connected properly.
2. Try turning the brightness control on the monitor to increase the brightness of the monitor.

TROUBLE-SHOOTING

3. *Make sure the monitor switch adapter board is in the expansion slot correctly.*
4. *Remove the top cover of the CPU as detailed in Appendix D and check the position of the monitor selection switch to make sure the switch is in the right position for the monitor you are using.*

TROUBLE-SHOOTING

THE COMPUTER FREEZES AND DOES NOT RESPOND TO THE KEYBOARD

1. Check to make sure the keyboard is properly connected to the keyboard.
2. Warm start your computer by holding down the [Ctrl] and [Alt] keys and pressing the [Del] key.
3. Turn the power off, wait a few seconds and try turning the power back on.

7.4 WARNING/ERROR MESSAGES

Bad command or file name

You have asked for a DOS command or a file that is not on the disk you are using. Check the spelling and spacing of your command. If this still does not help, check the directory of your disk and make sure the command or file is on the disk.

File not found

This means the computer can't find your file. Check your spelling and extension. Then check the directory on the disk to see if it contains the file.

Bootstrap load failure

You have opened the drive door before the MS-DOS sign on message appeared.

Non-system disk

Replace and strike any key when ready

The disk you are using is not a disk formatted with MS-DOS and the computer can not read the disk. (Refer to section 3.3.1 for more information on write protection.)

TROUBLE-SHOOTING

**Write protect error writing drive x:
Abort, Retry, Ignore?**

You are trying to write on a diskette that is write-protected. Remove the write-protect sticker on the disk if you want to write on it.

Keyboard stuck / Key failure

Try striking the F1 key. If the keyboard has a problem return it to the dealer you purchased it from.

**No boot...
Not a boot...**

The computer can't boot from the disk you are using. In other words, the computer can't start from that disk, replace it with another disk.

As to other warning/ error messages, only a trained technician should try to correct them.

APPENDIX A

INSIDE THE BASE UNIT

I WHAT'S INSIDE THE BASE UNIT?

As was stated before, the parts inside the base unit are the "computer". The standard parts inside include: the power supply, a 5 slot expansion unit, one or two floppy disk drives, and a system board. Your system may also contain a Winchester disk controller card and Winchester disk drive (Figure A1).

The system board (PWA-TURBO) is a single board microcomputer integrating the real-time clock and floppy disk controllers to provide a low cost single board system. It has been able to extend IBM's system speed from 4.77MHZ to 8MHZ.

The PWA-TURBO uses Intel's 8088-2 as the host CPU. The board supports up to 640K bytes of RAM. The PWA-TURBO processing capacity can also be extended by adding an 8087-2 math coprocessor into the available socket. Two EPROM sockets are available for either the BIOS ROM our company offers (using one socket) or any user developed code.

A INSIDE THE BASE UNIT

INTERIOR MACHINE DESIGN

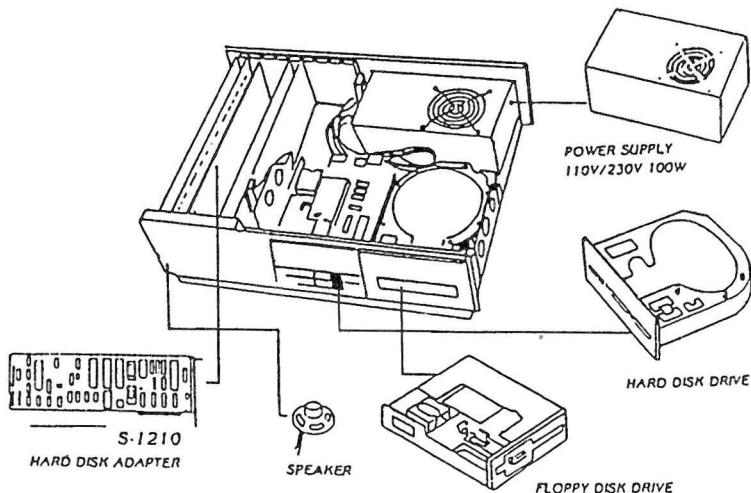


Figure A1 A View Inside The Base Unit

A INSIDE THE BASE UNIT

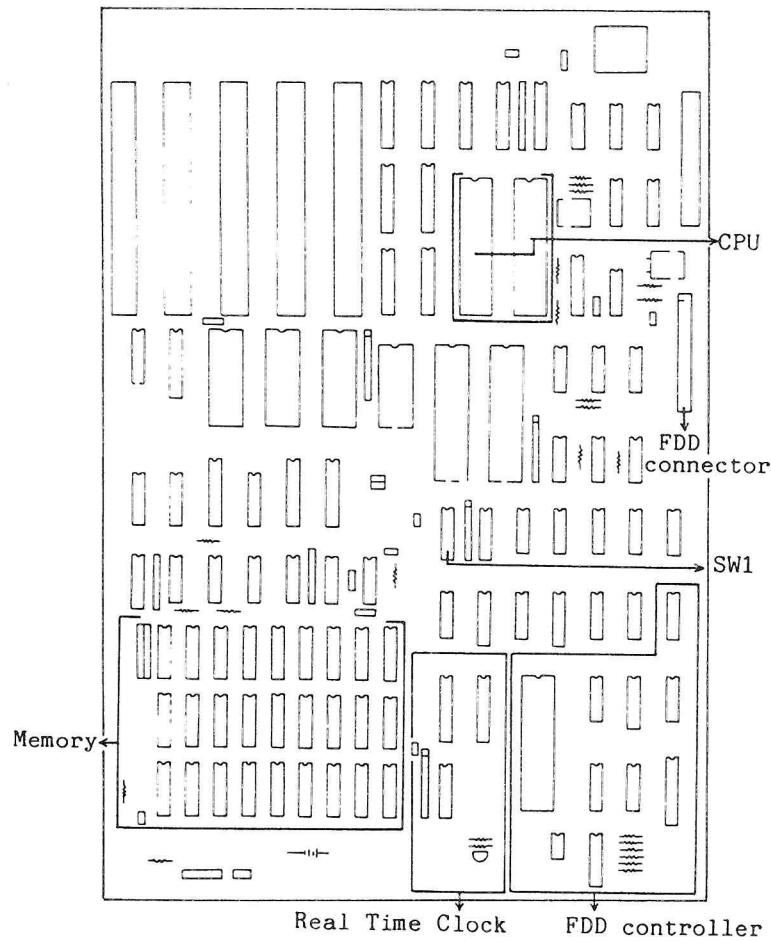


Figure A2 PWA-TURBO Functional Block Diagram

A INSIDE THE BASE UNIT

II THE POWER SUPPLY

The power supply adjusts the line current (120V AC) to that required by the computer components. Computer components require either +12V or +5V DC. The power supply is located inside the cage in the back corner. Do not under any circumstances remove the cover of the power supply. There are no serviceable parts inside and the high voltages could result in severe shock.

III THE PROCESSOR

The processor section consists of the 8088-2 CPU and its associated support chips. The support chips include the 8253 Programmable Interval Timer, 8237 DMA controller, 8259 Interrupt controller, and the 8255 Programmable Peripheral Interface.

The 8088-2 operates at a 8/4.77-MHZ clock rate which is keyboard selectable by typing t5 or t8. Two of the 8253 timer channels are available to the user under software control. The timer has a resolution of 1.05 micro-seconds. Also, there are 5-user available interrupts. Finally, of the 4 DMA channels supported by the PWA-TURBO two are user-defined. Two DMA channels are used by the system for the floppy disk controller and memory refresh.

IV MEMORY

The PWA-TURBO can support up to the maximum 640K bytes of RAM. System memory configuration is shown in Figure A3.

Two 28-pin EPROM sockets are available on the board (Figure A2). The PWA-TURBO is designed to accomodate either the 128K, or 256K EPROMs.

A INSIDE THE BASE UNIT

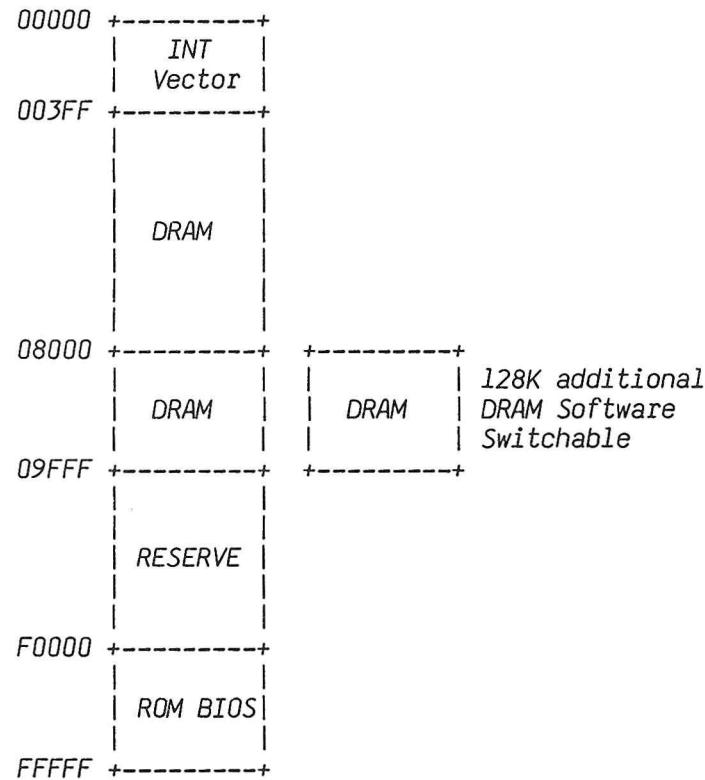


Figure A3 System Memory Configuration

A INSIDE THE BASE UNIT

V I/O EXPANSION BUS

The PWA-TURBO supports 5 IBM PC compatible I/O expansion slots as shown in Figure A2. The expansion slots are available for use with any of the available IBM PC compatible peripheral boards. Since some peripheral controllers have been implemented on the PWA-TURBO, care must be taken when using certain peripheral boards. In general, when boards with functions similiar to those already on the PWA-TURBO are used, alternate addresses must be used. Those functions include the floppy disk and real-time clock.

VII COLOR/GRAFICS DISPLAY ADAPTER CARD

The color/graphics display adapter card is used to control the display signals for the color display monitor. It is fully compatible with IBM color display adapter card. It can display 40*25 characters in alphanumeric low resolution mode and 80*25 characters in high resolution mode. In all-points-addressable graphics mode, 160*100 pixels are displayed in low resolution mode, 320*200 pixels displayed in medium resolution mode and 640*200 pixels displayed on high resolution mode. Sixteen colors are provided for low resolution mode, four colors for medium resolution mode and one color for high resolution mode. Two composite video outputs are installed on the same board with one for color display and the other for monochrome display with sixteen gray scales. The board can reside in any full size expansion slot.

A INSIDE THE BASE UNIT

VIII I/O INTERFACES

The PWA-TURBO also supports standard interfaces for the IBM PC compatible keyboard, speaker port, and a reset port.

The standard keyboard connector is provided on the board to allow direct connection to the PWA-TURBO.

Both a speaker and reset outputs are provided on the board at connectors J11 and J6, respectively. The reset logic performs a system-wide reset similar to a power-on reset. This is accomplished by a direct connection to the on-board power-on reset logic. The reset is performed by making a connection between the two terminals of J6. Note that all filtering is performed by the on-board power-on reset logic.

APPENDIX B

INTERNAL SWITCH SETTINGS

I CPU SWITCH SETTINGS

One DIP switch on the System Board is used to set option parameters within the computer. If you install a different monitor, more memory, or another floppy disk drive, you will need to change some of the switch settings. Figure B1 shows the locations of the switches on the System Board.

<u>Position</u>	<u>Function</u>
1	Under Normal Operation OFF
2	On = no 8087 coprocessor Off= 8087 coprocessor
3-4	Always off
5-6	Type(s) of display adapters you are using
7-8	Number of diskette drives installed

B INTERNAL SWITCH SETTINGS

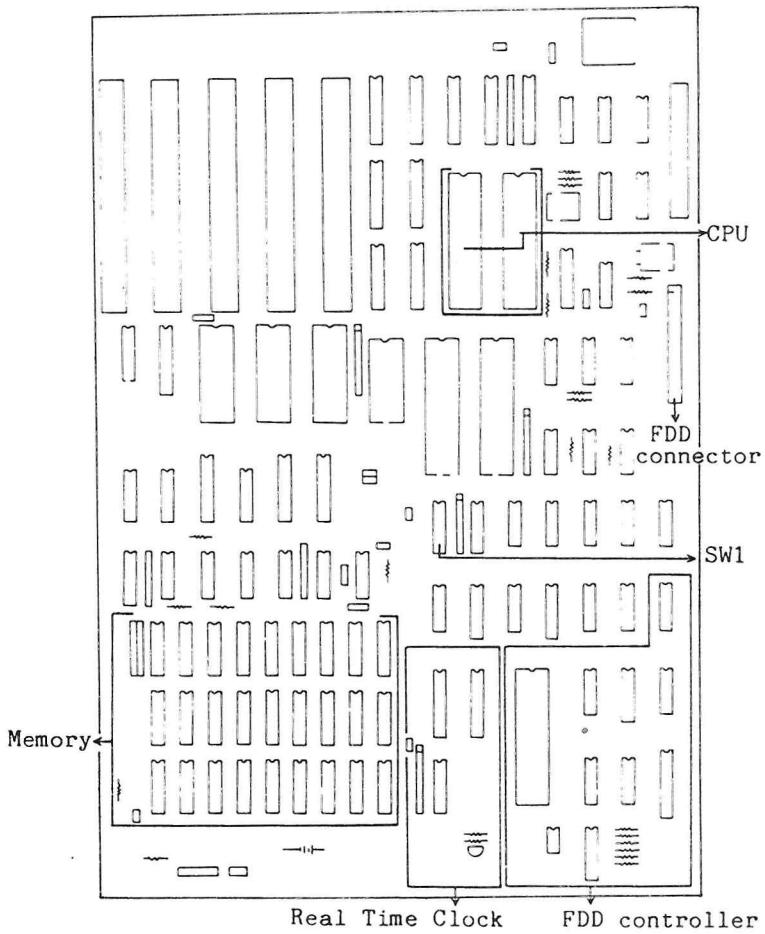


Figure B1 Layout of the System Board

B INTERNAL SWITCH SETTINGS

A SWITCH SETTINGS FOR FLOPPY DISK DRIVES

SW1 switch positions 7 and 8 are used to indicate the number of floppy disk drives that the system is to recognize.

System card SW1	

1 disk drive	ON o o o o o o x x o o o o o o o o 1 2 3 4 5 6 7 8

2 disk drives	ON o o o o o o o x o o o o o o x o 1 2 3 4 5 6 7 8

NOTE

- o*
- o unrelated to this function*
- o*
- x means switch OFF*
- x*
- o means switch ON*

B INTERNAL SWITCH SETTINGS

B SWITCH SETTINGS FOR MONITOR TYPE

SW1 switch positions 5 and 6 are used to indicate the type of monitor that you have attached to the computer. You can operate your color/graphics monitor in either of two modes. One mode displays 80 columns horizontally and 25 rows vertically. The other mode displays 40 columns horizontally by 25 rows vertically. The 80x25 mode is preferred by most people but, if you are using a television or one of the less expensive color/graphics monitors, you may not be able to read text in the 80x25 mode because of loss of character resolution and you will have to use the 40x25 mode.

If you want to use a monochrome monitor, you will have to purchase a different monitor card to install in the computer. Monochrome monitors are often used by businesses which do a lot of text processing because the text resolution is very good.

System card SW1	

no monitor	ON o o o o x x o o o o o o o o o o 1 2 3 4 5 6 7 8

40x25 color	ON o o o o o x o o o o o o x o o o 1 2 3 4 5 6 7 8

B INTERNAL SWITCH SETTINGS

80x25 color

ON o o o o o x o o o
o o o o o o x o o o
1 2 3 4 5 6 7 8

monochrome

ON o o o o o o o o
o o o o x x o o o
1 2 3 4 5 6 7 8

II INSTALLING A SECOND FLOPPY DISK DRIVE

A second floppy disk drive can be installed in the PC if your system was shipped with only 1 floppy disk drive. You need to purchase one Tandon TM-100-2 compatible half-height floppy disk drive, and two number 8 by 11/16 inch machine screws. The floppy disk drive will sit on top of the one already installed. Installation instructions will be included with the disk drive.

III MOTHER BOARD JUMPER SETTINGS

NOTE

See Figure B2 for the jumper positions and connector positions on the mother board.

1. JP1 *1-2 (NO LONGER USED)
- &2. JP2 1-2 POWER GOOD RESET
- *2-3 SWITCH RESET

B INTERNAL SWITCH SETTINGS

- 3. JP3 *1-2 27128X1 OR 27128X2
2-3 27256X1 OR 27256X2
- &4. JP4 *1-2 BANK SELECT (128K BYTES) ENABLE
I/O PORT 'CO' H
2-3 BANK SELECT (128K BYTES) ENABLE
8255 PORT B NO.2
- 5. JP5 *1-2 (NO LONGER USED)
- &6. JP6 1-2 SOFTWARE SPEED SELECT TIMING
OPTION 1
*2-3 SOFTWARE SPEED SELECT TIMING
OPTION 2
- 7. JP7 *1-2 (NO LONGER USED)
- 8. JP8 *1-2 (NO LONGER USED)
- 9. JP9 *1-2 ENABLE SEL F.D.D
- 10. JP10 *1-2 ENABLE WRITE F.D.C REGISTER
- 11. JP11 *1-2 ENABLE READ REAL TIME CLOCK
STATUS
- 12. J7 : 1-2 POWER ON 4.77MHZ
*2-3 POWER ON 8MHZ

B INTERNAL SWITCH SETTINGS

IV MOTHER BOARD CONNECTOR POSITIONS

NOTE

*See Figure B2 for the jumper positions
and connector positions on the mother
board.*

- &1. J1 ~ J5 : EXPANSION SLOT
- 2. J6 : RESET SWITCH
- 3. J8 : KEYBOARD CONNECTOR
- 4. J9 : POWER CONNECTOR
- 5. J10 : F.D.C CONNECTOR
- 6. J11 : SPEAKER CONNECTOR
- 7. J12 : LED CONNECTOR

& *This is a complete list of all the jumper
positions. The jumpers marked w/ & have
no function on the mother board.*

B INTERNAL SWITCH SETTINGS

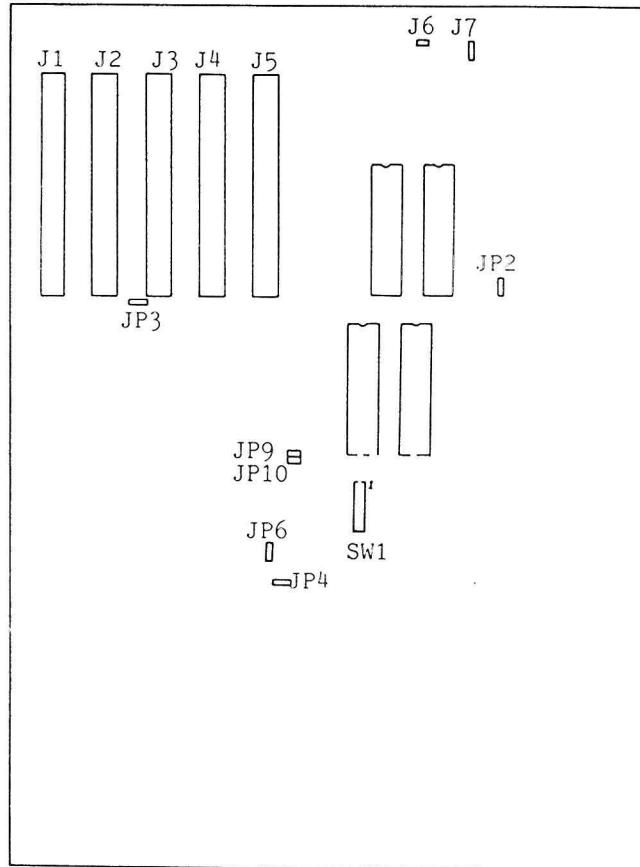


Figure B2 Motherboard Jumper Positions

B INTERNAL SWITCH SETTINGS

IV 4.77/8 MHz CLOCK SWITCH

HARDWARE SWITCH: SET J7 BEFORE POWER ON
J7 1-2 SHORT --> POWER ON 4.77 MHz
J7 2-3 SHORT --> POWER ON 8.00 MHz

SOFTWARE SWITCH: AFTER LOADING MS-DOS

- * RUN T8.COM TO CHANGE THE SYSTEM CLOCK TO 8.00MHz
- * RUN T5.COM TO CHANGE THE SYSTEM CLOCK TO 4.77MHz

V 128K ADDITIONAL MEMORY BANK SWITCH

The system has 768KB total memory. This is 128KB more than the maximum memory of the IBM PC/XT. The additional 128KB memory share the same address space of the top 128KB of the system address (512K to 640K, or 80000 to 9FFFF). The bank switch is controlled by port 'C0H bit 6.

PORt C0 BIT 6 ON(1): Power on default active bank.

PORt C0 BIT 6 OFF(0): User selectable, user has to clear memory before use this bank at first time. (Parity check will occur if memory does not clear).

NOTE

If you want to use the additional memory reserved, you must design the software yourself.

APPENDIX C

POWER REQUIREMENTS

I POWER REQUIREMENTS FOR CANADA AND THE U.S.

The power requirements for the system are as follows:

AC input: 110 VAC
FUSE: 3.0A, 250 VAC

II POWER REQUIREMENTS FOR EUROPE

The power requirements for the system are as follows:

AC input: 220 VAC (modified in the factory)
FUSE: 2A, 250 VAC

NOTE

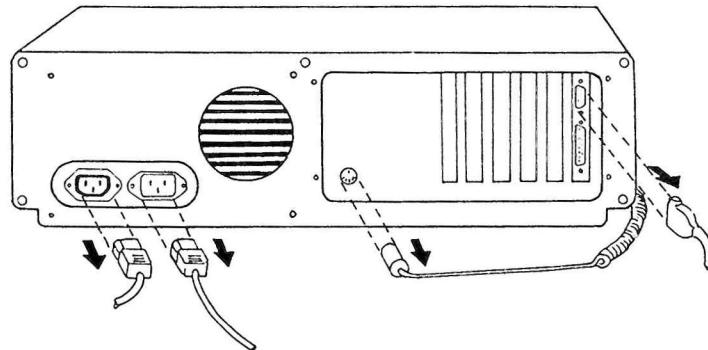
**The base unit requires a monitor that
operates at the same alternating current
as the base unit.**

APPENDIX D

INSTALLING AN ADD-ON ADAPTER

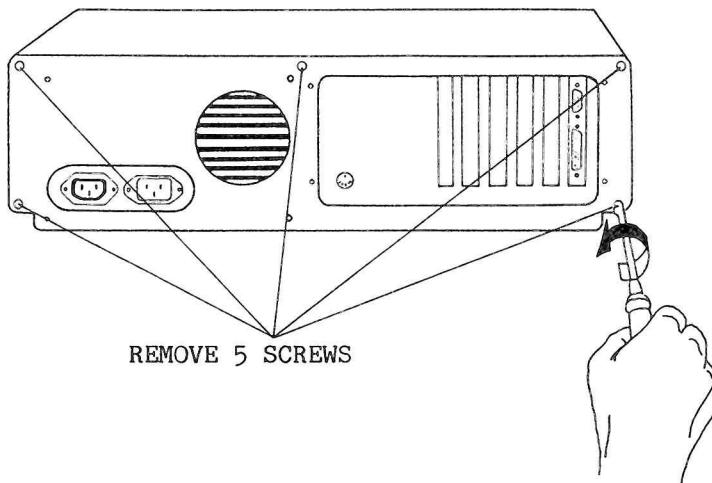
Add-on cards allow you to add options to your computer system. They include the video display adapter (for a monochrome monitor), color graphics adapter, and serial/parallel adapter (for a printer). Please follow the steps listed below to install an add-on card:

1. Turn the power switch of the system unit to the off position.(1= ON, 0=OFF)
2. Turn off all power switches of external devices, such as printer, monitor, or TV ... etc.
3. Unplug all power cords from wall outlets.
4. Disconnect all cables from the rear panel of the system as follows:



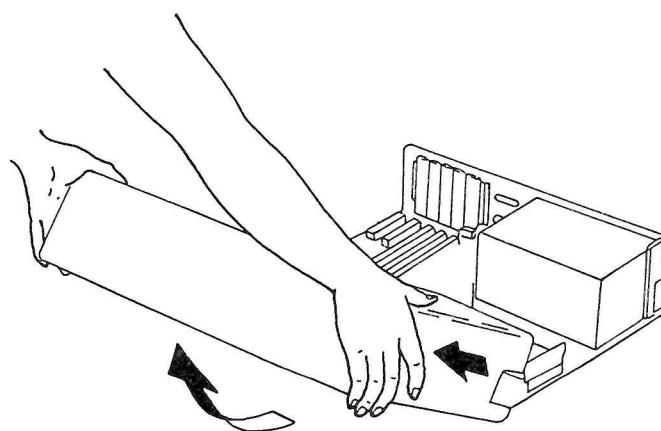
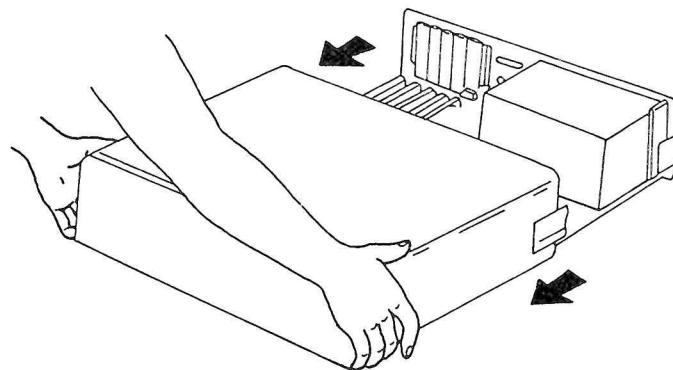
D INSTALLING AN ADD-ON ADAPTER

5. Position the system unit to allow access to the rear panel.
6. Use a Phillips screwdriver to remove the five cover mounting screws in a counterclockwise manner as follows:



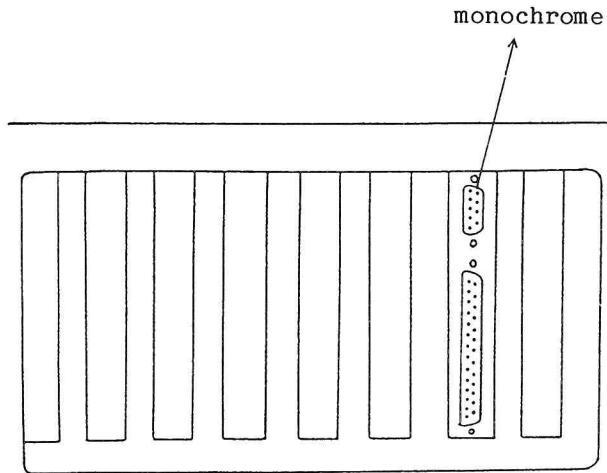
D INSTALLING AN ADD-ON ADAPTER

7. Carefully slide the top cover away from the rear panel and towards the front. When the top cover does not go any further tilt the cover from the chassis and set it aside as follows.



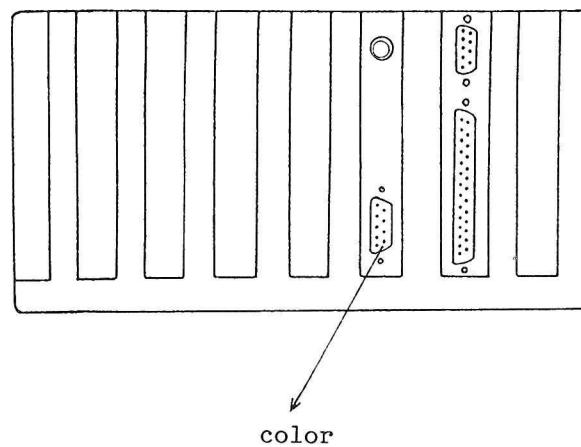
D INSTALLING AN ADD-ON ADAPTER

8. Use a Phillips screwdriver to remove the mounting screws of the adapter bracket, and then pull out the bracket.
- 9a. Hold the video display adapter by the top corners, and press it firmly into any available slot (usually the left most one) on the system board.
- 9b. In connecting the color graphics monitor and printer, plug the color graphics adapter and serial/parallel adapter into any two available slots on the system board.
- 10a. At the rear panel of the system unit, you can see the pin connector of the video display adapter as illustrated below:



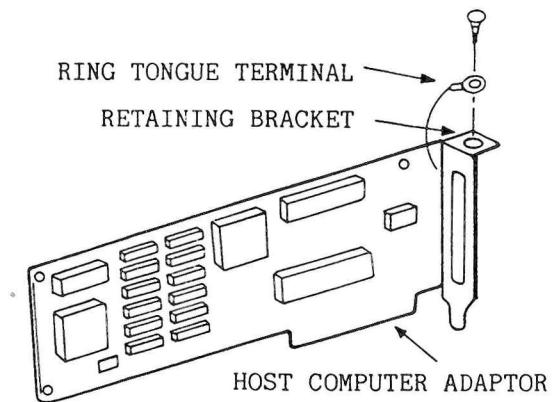
D INSTALLING AN ADD-ON ADAPTER

10b. You should be able to see the pin connectors of the color graphics adapter and serial parallel adapter in the rear panel as illustrated below:



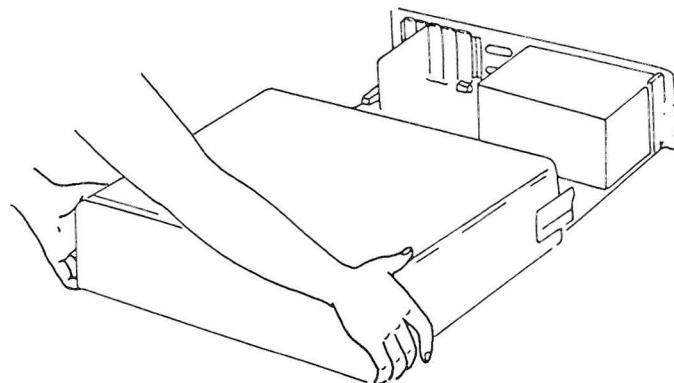
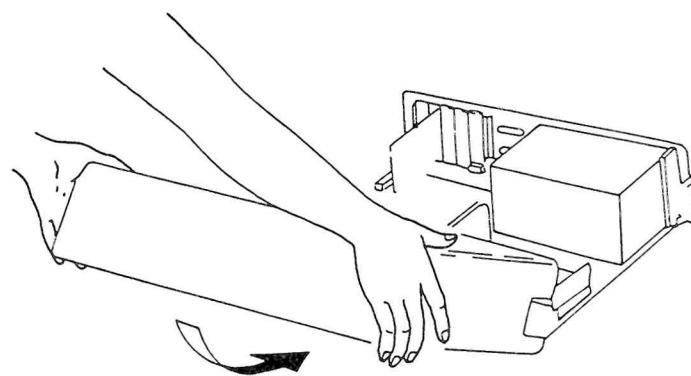
D INSTALLING AN ADD-ON ADAPTER

11. *Tighten the screw into the top hole of the adapter bracket.*



D INSTALLING AN ADD-ON ADAPTER

12. Replace the top cover by positioning the cover as shown below:



D INSTALLING AN ADD-ON ADAPTER

13. Align the five cover mounting screws and tighten with a Phillips screwdriver.

